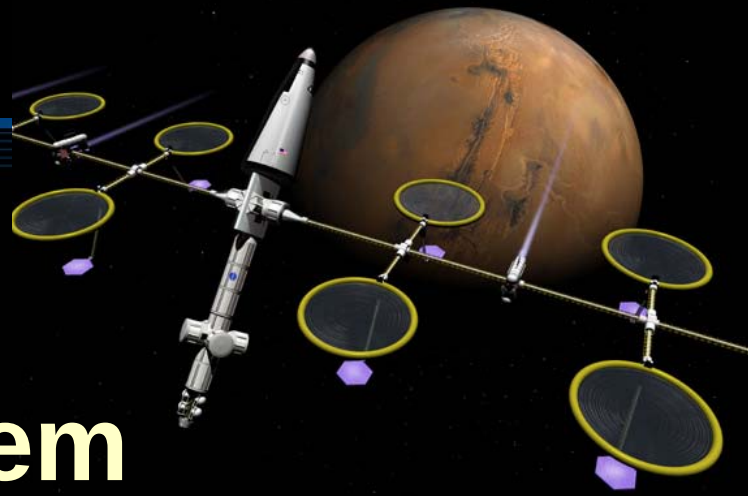
The Solar System: Recent Exploration Results

The solar system has been visited by space probes, ranging from the Mariner Mercury-Venus mission exploring inward toward the sun, and continuing through the Voyager probes out into interstellar space and (on its way now) the New Horizons probe to Pluto and the Kuiper belt. This talk examines what we know of the planets of the solar system from probes, and talks about where we will go from here.

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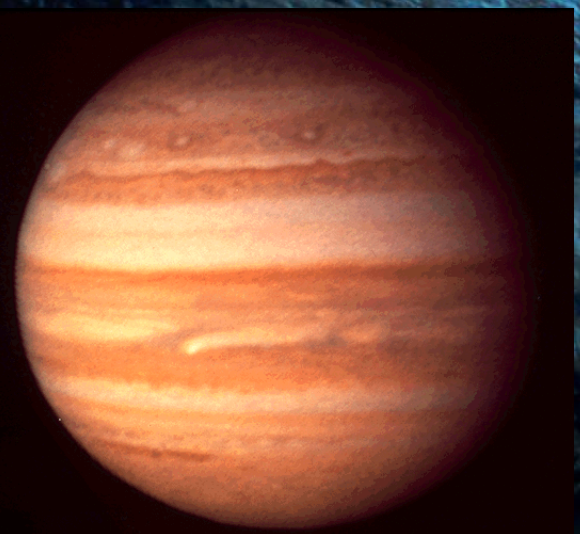
Geoffrey A. Landis
NASA John Glenn Research Center, Cleveland OH

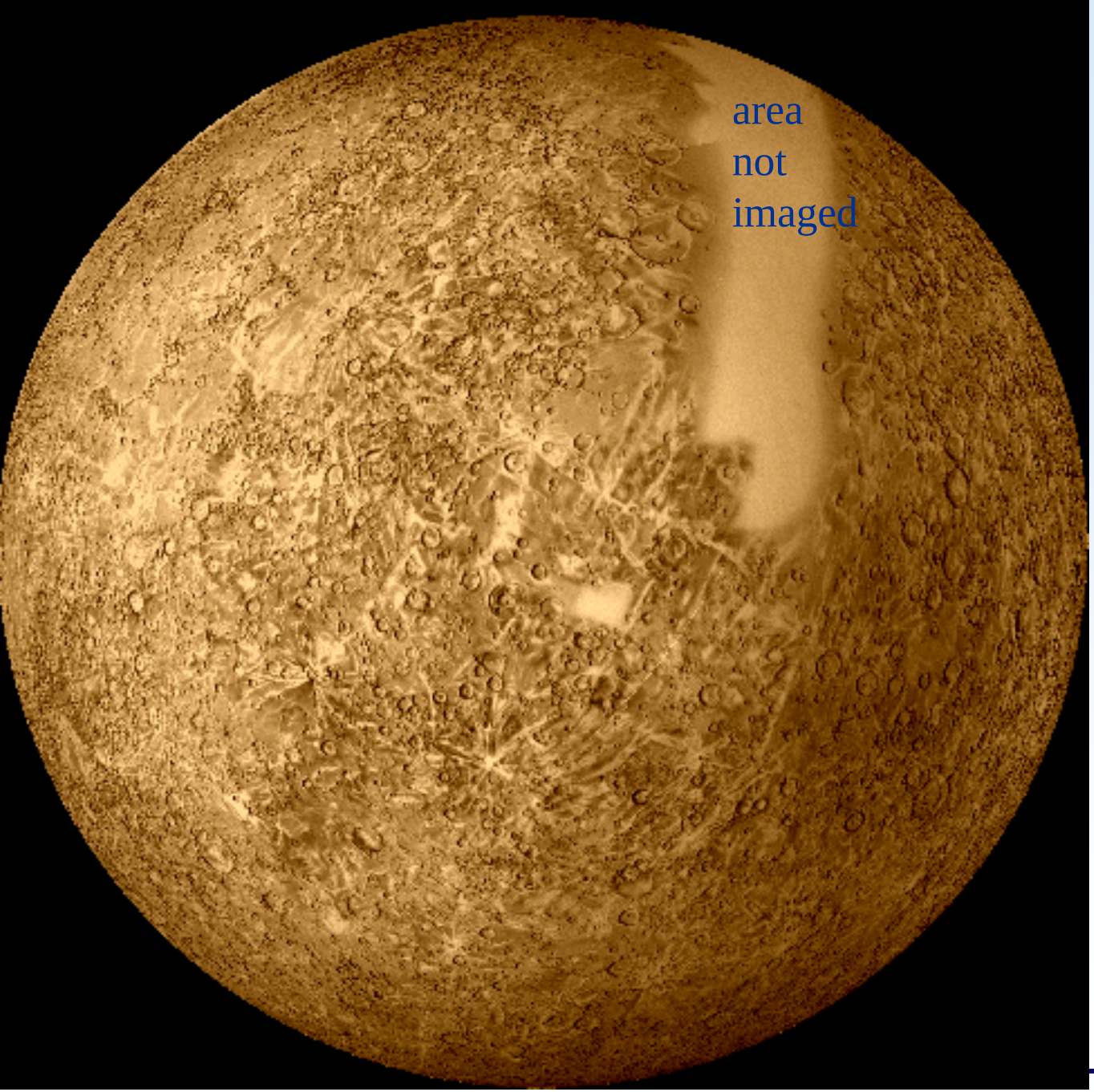




The Solar System

Recent Exploration Results

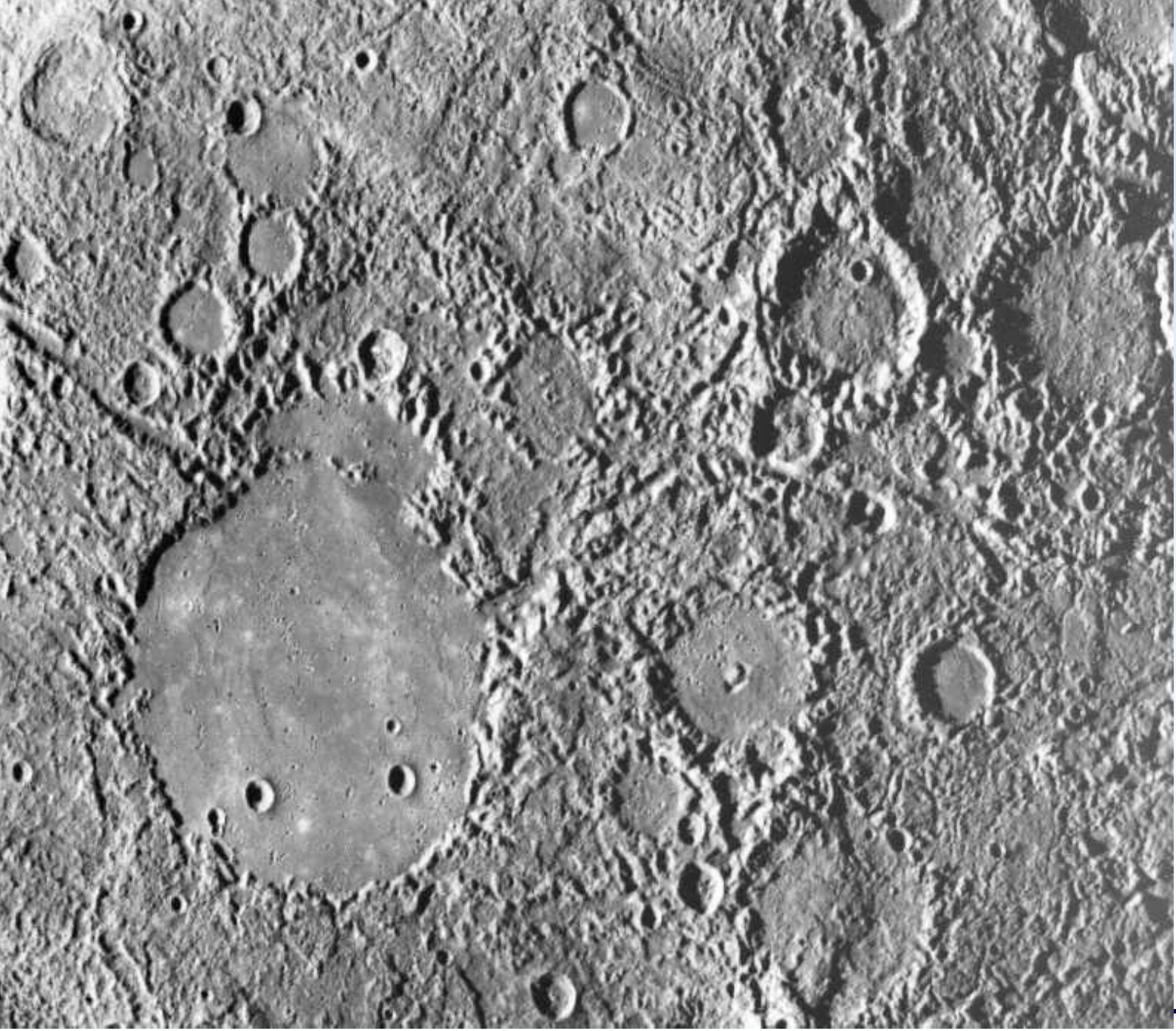




Mercury

(Hemisphere map from Mariner 10)

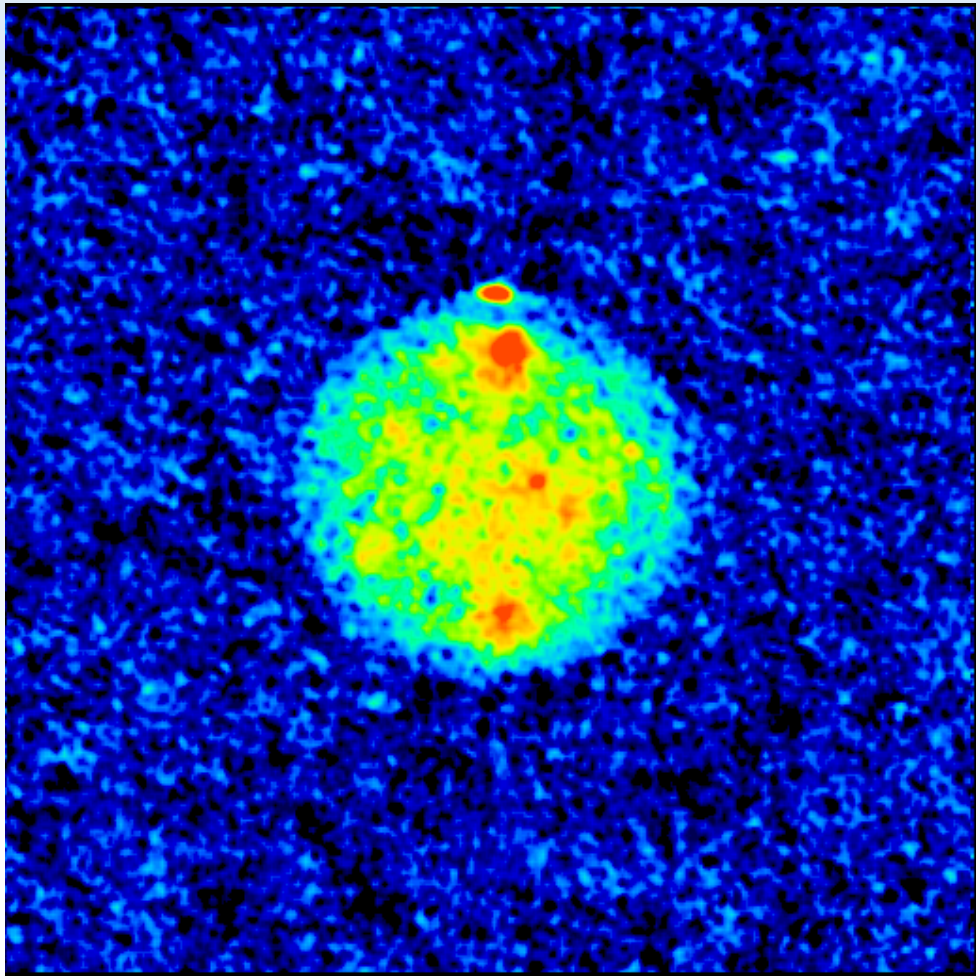
the smooth vertical band and patches visible above represent regions where no image information is available.



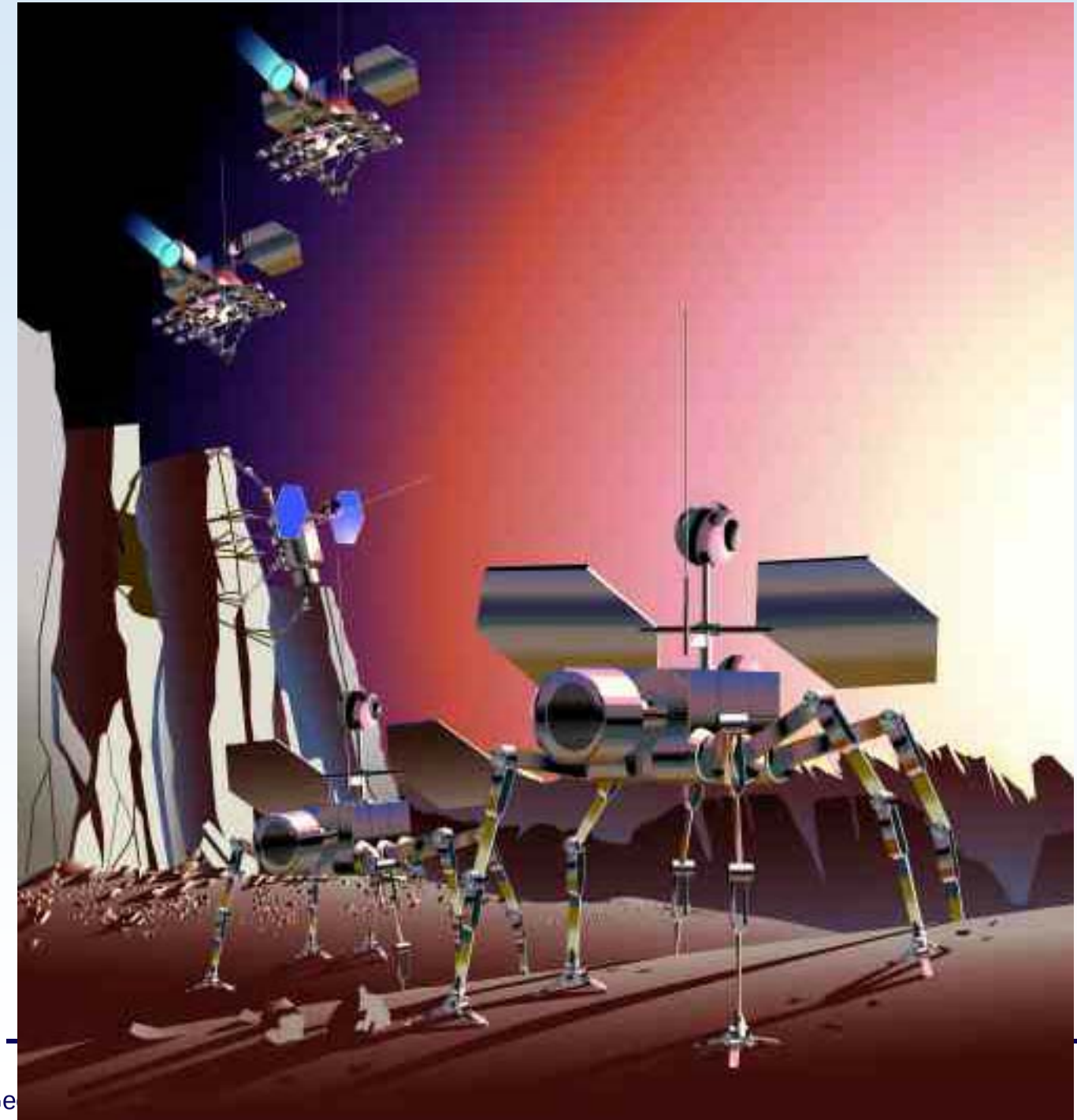
Mercury Close-up

from Mariner 10

Radar image of Mercury



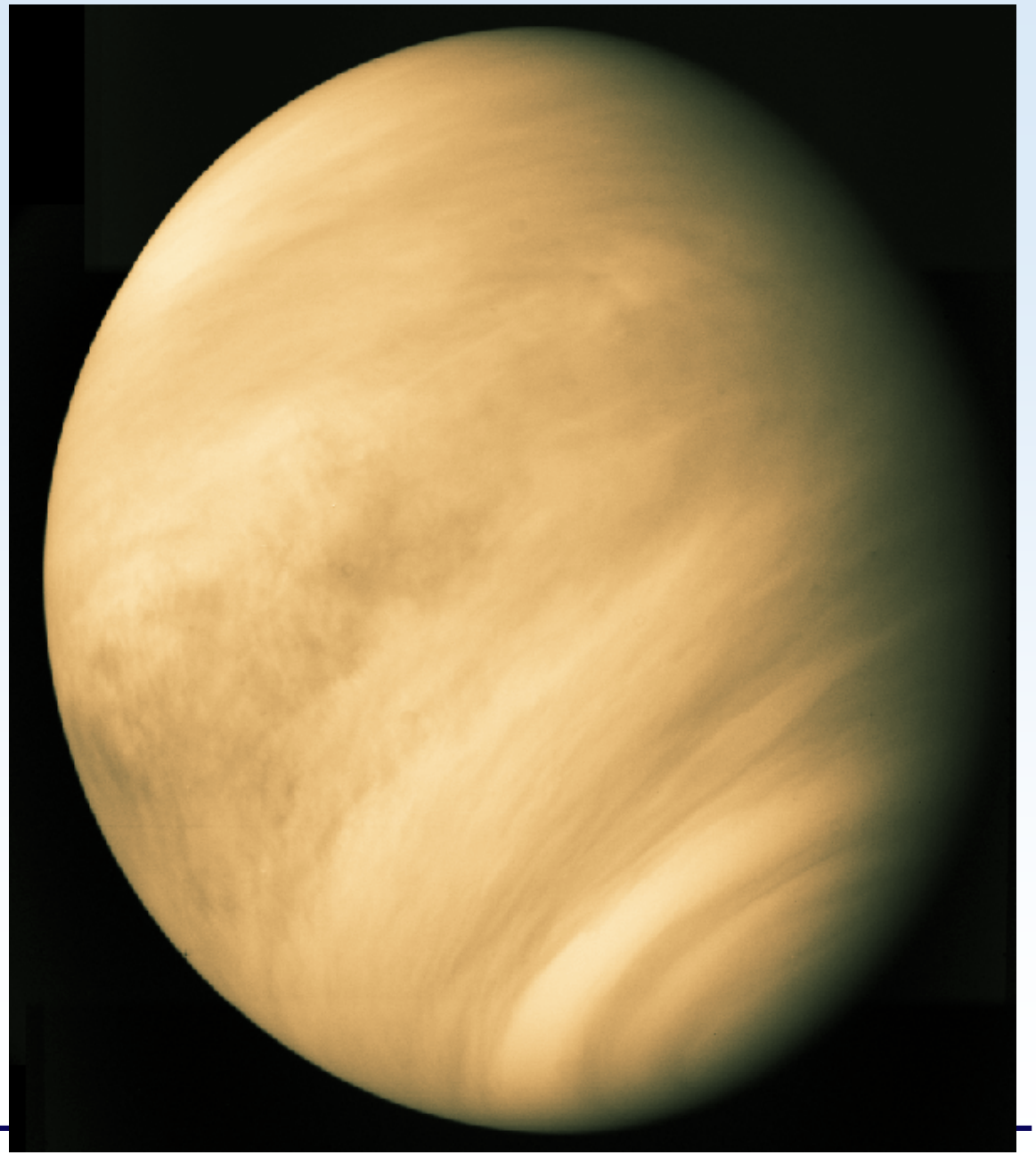
Goldstone-VLA radar image made in 1991.
Red areas are areas of high radar reflectivity,.



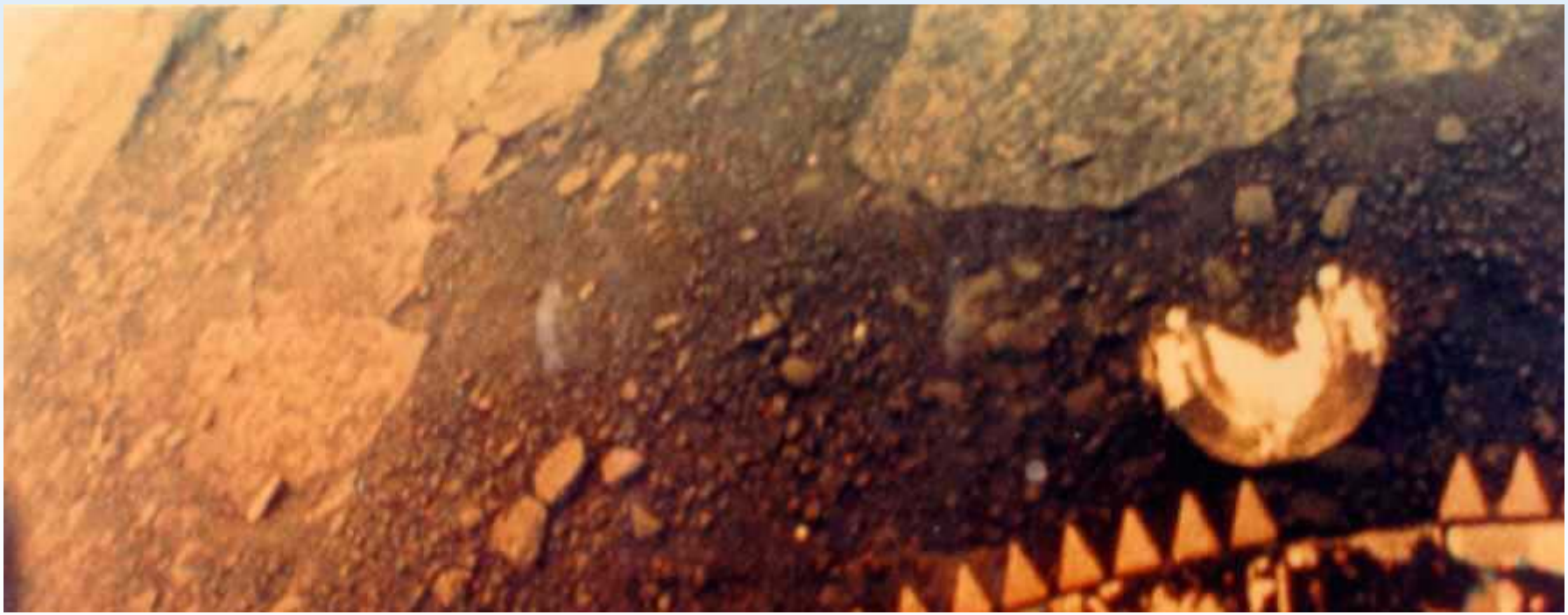
Exploring Mercury

A fleet of tiny robotic explorers swarm across the rugged surface of Mercury (illustration for "Avatars in Space," Geofffrey A. Landis)

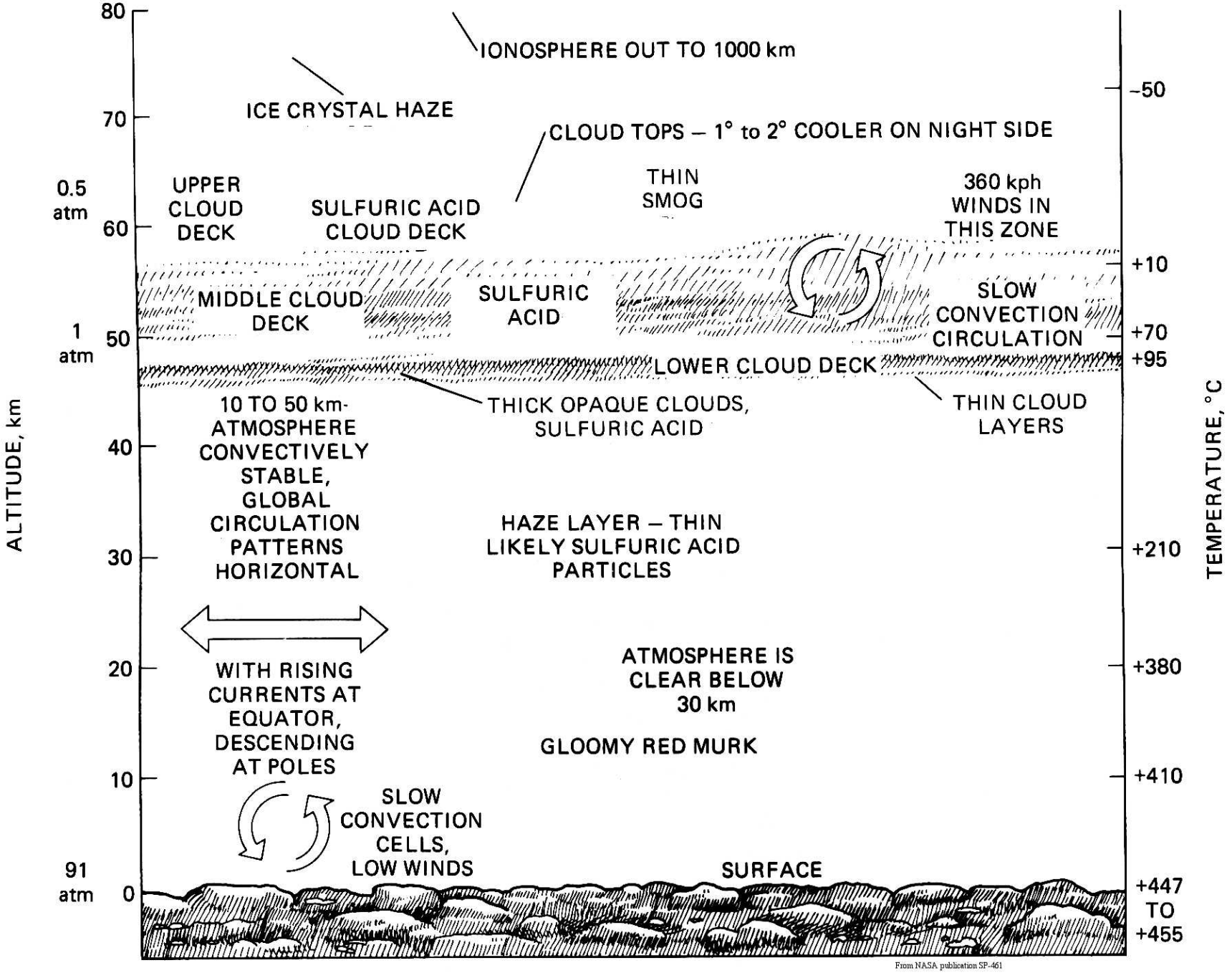
Venus



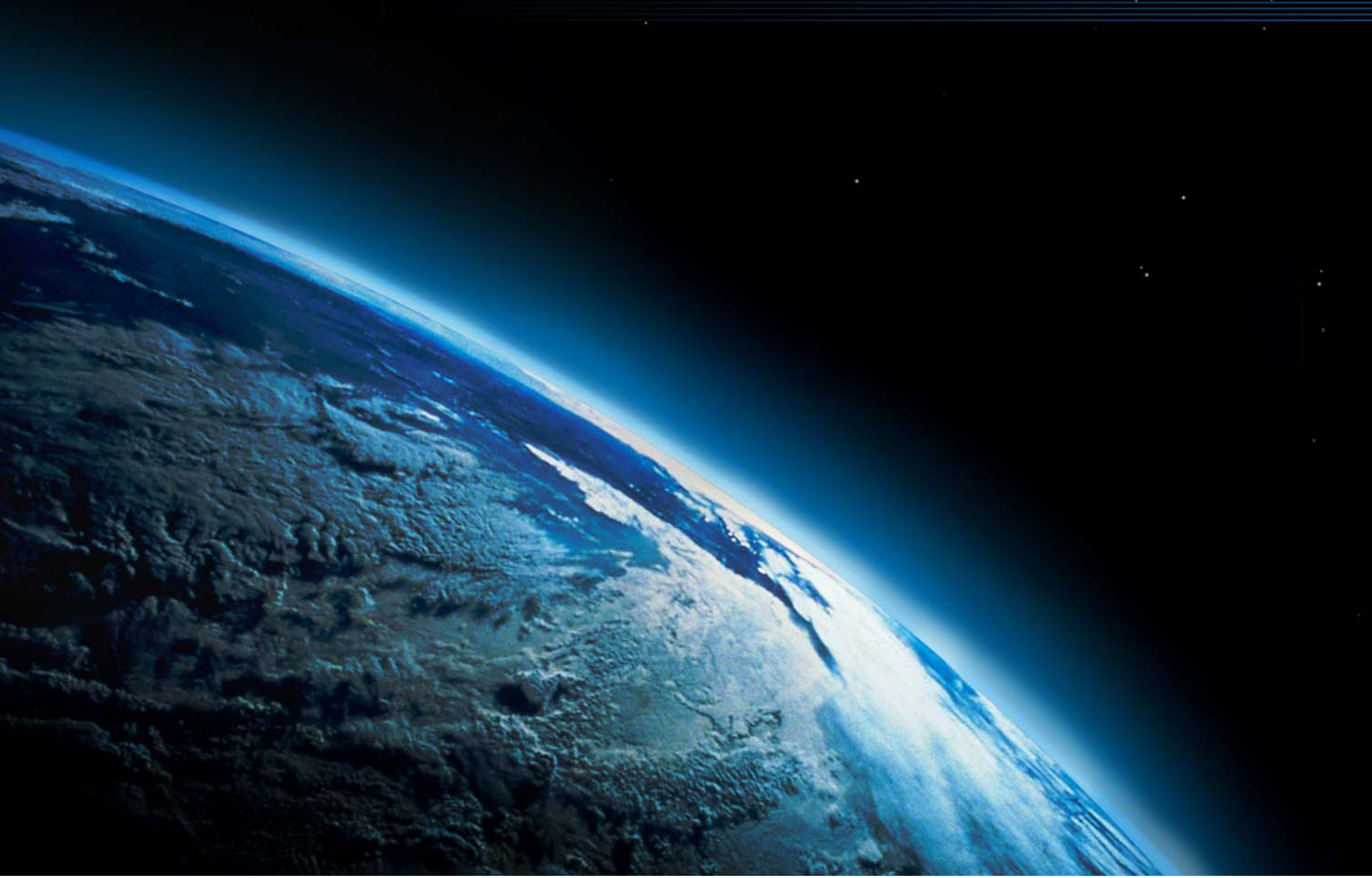
The Surface of Venus
seen from the Russian "Venera" Venus lander



The surface of Venus: 450C



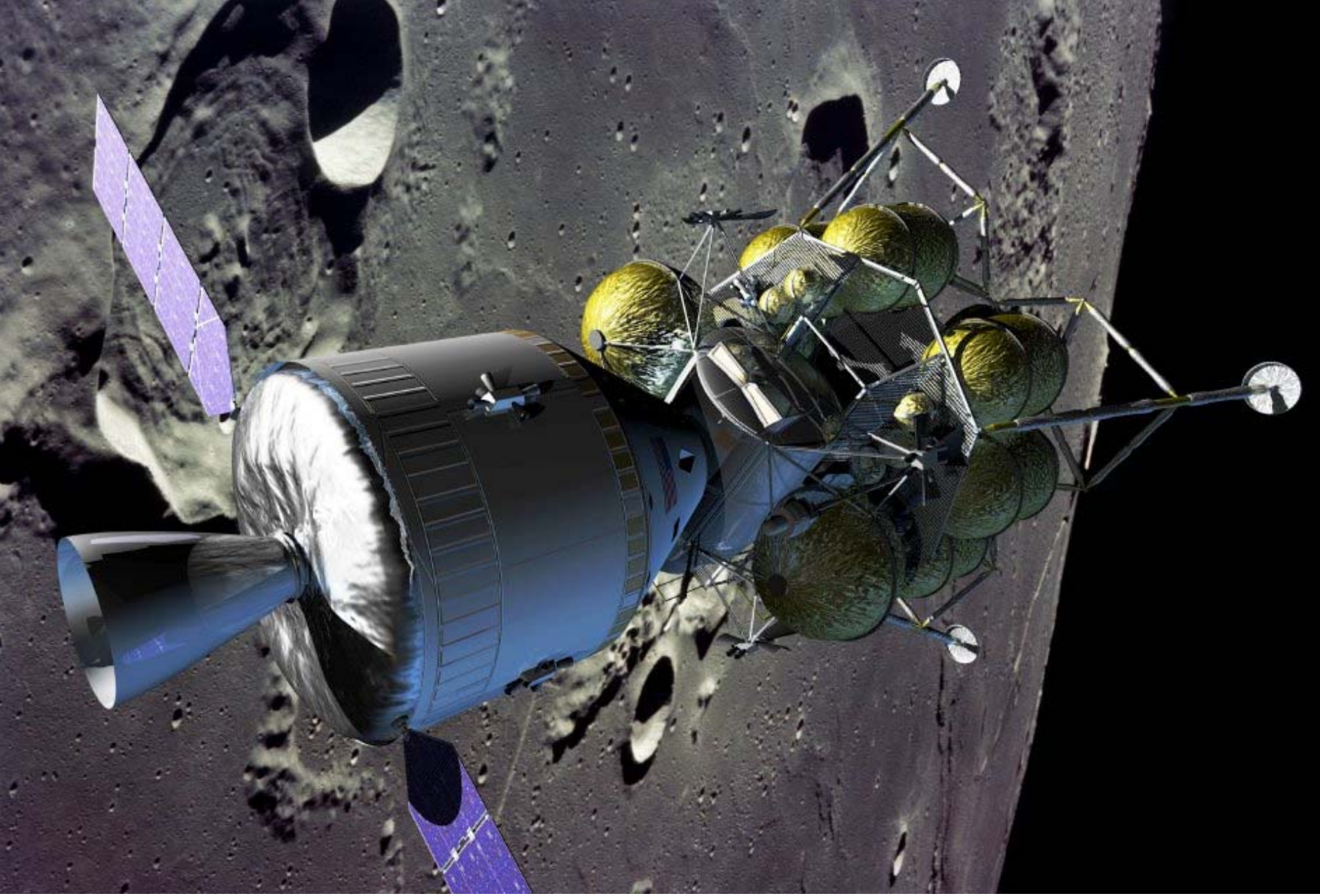
From NASA publication SP-461



Earth

Earth and Moon

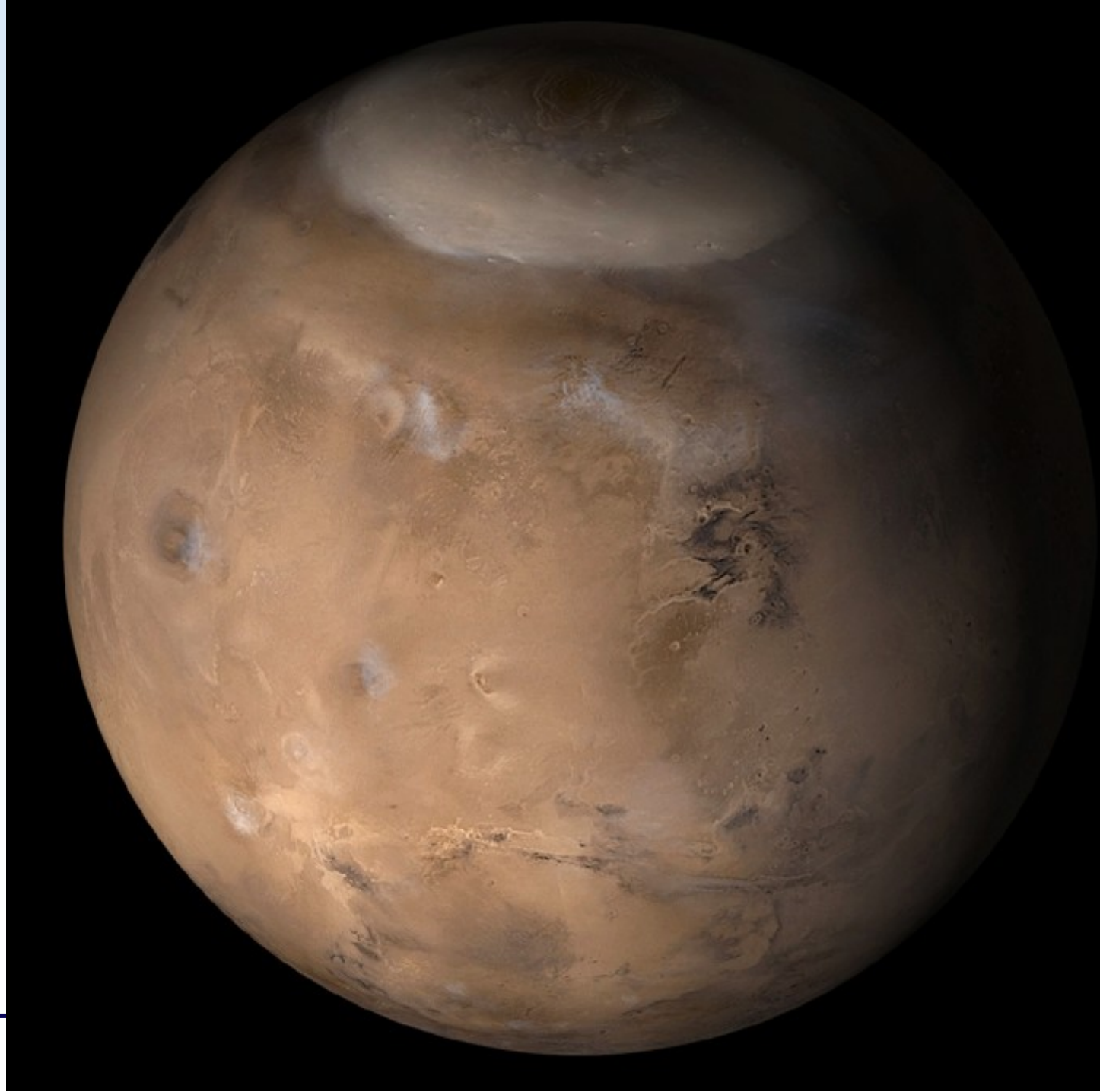




Return to moon spacecraft

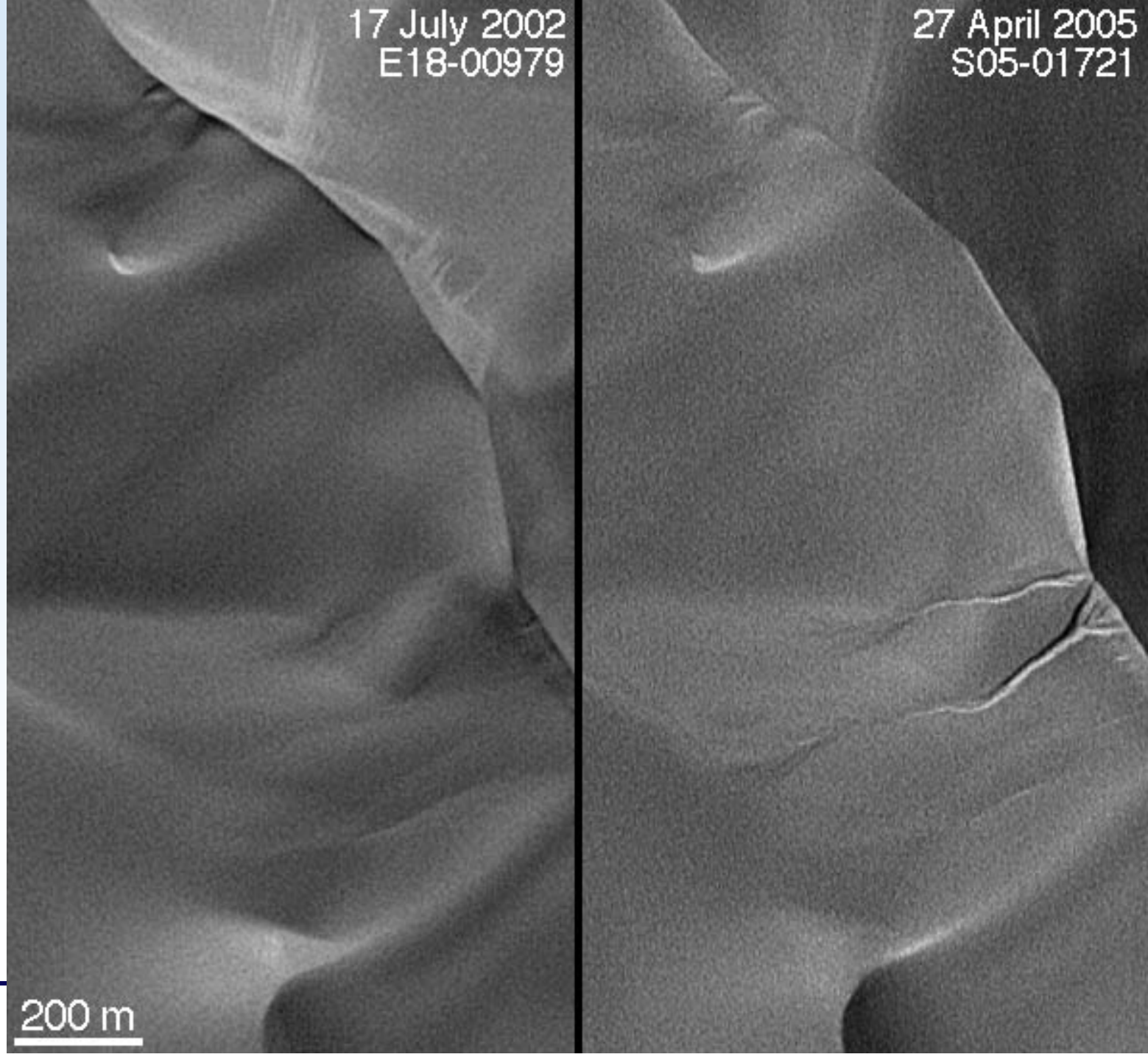


Mars

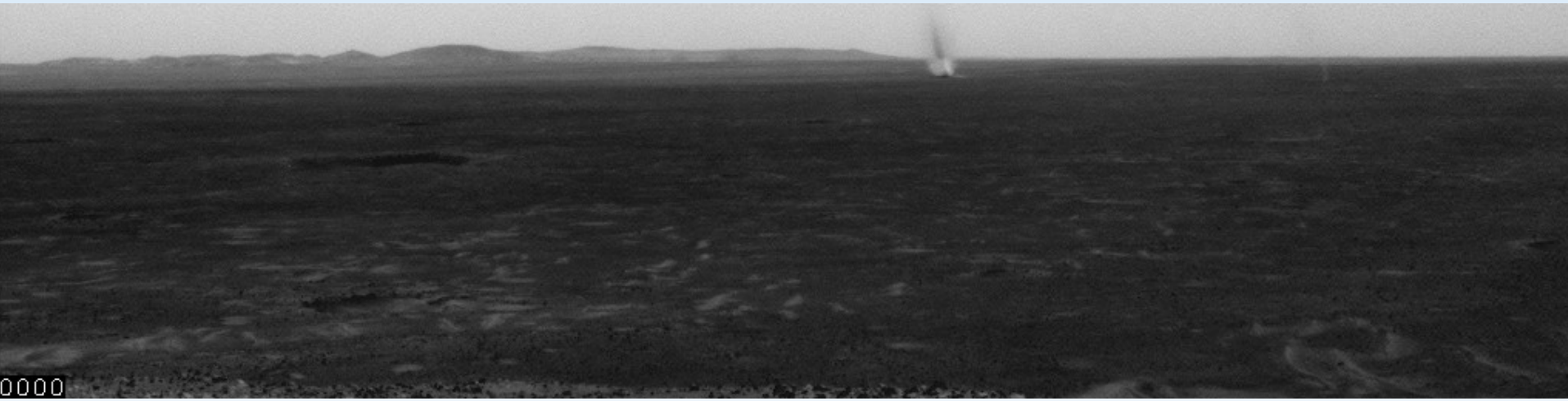




Geologically recent gully (MGS view)

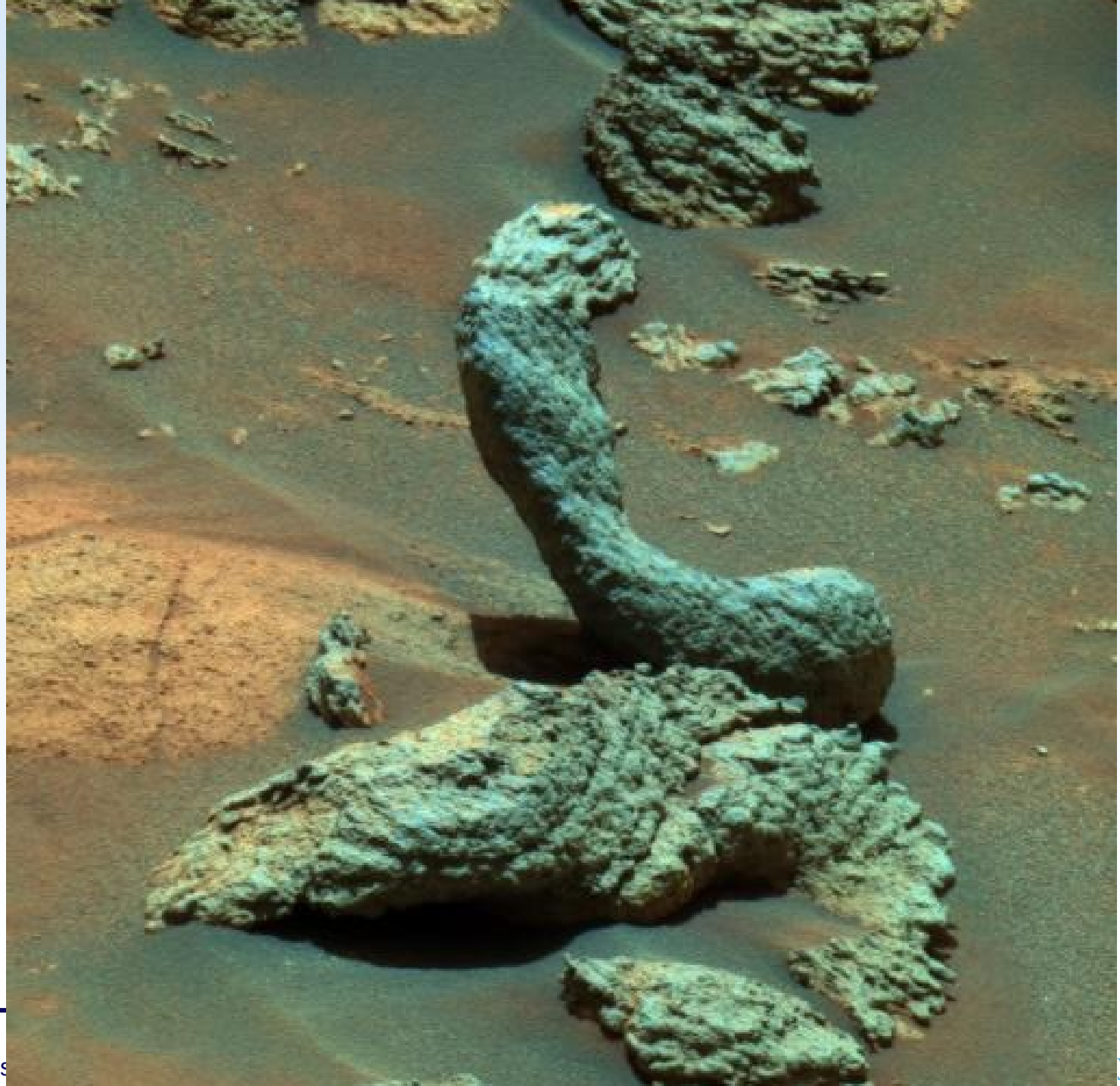


Dust devils

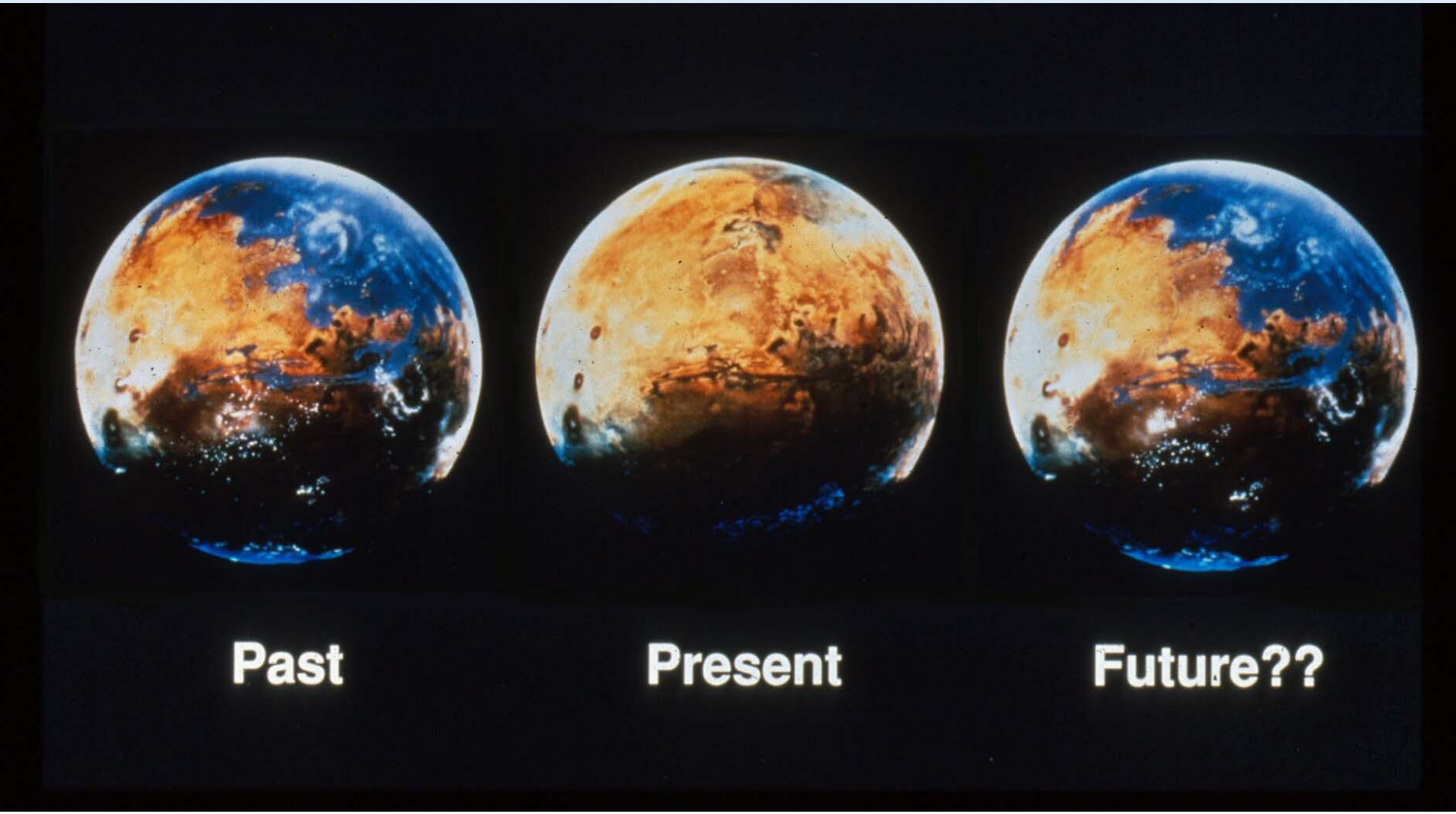


Sol 568(20 seconds between frames)

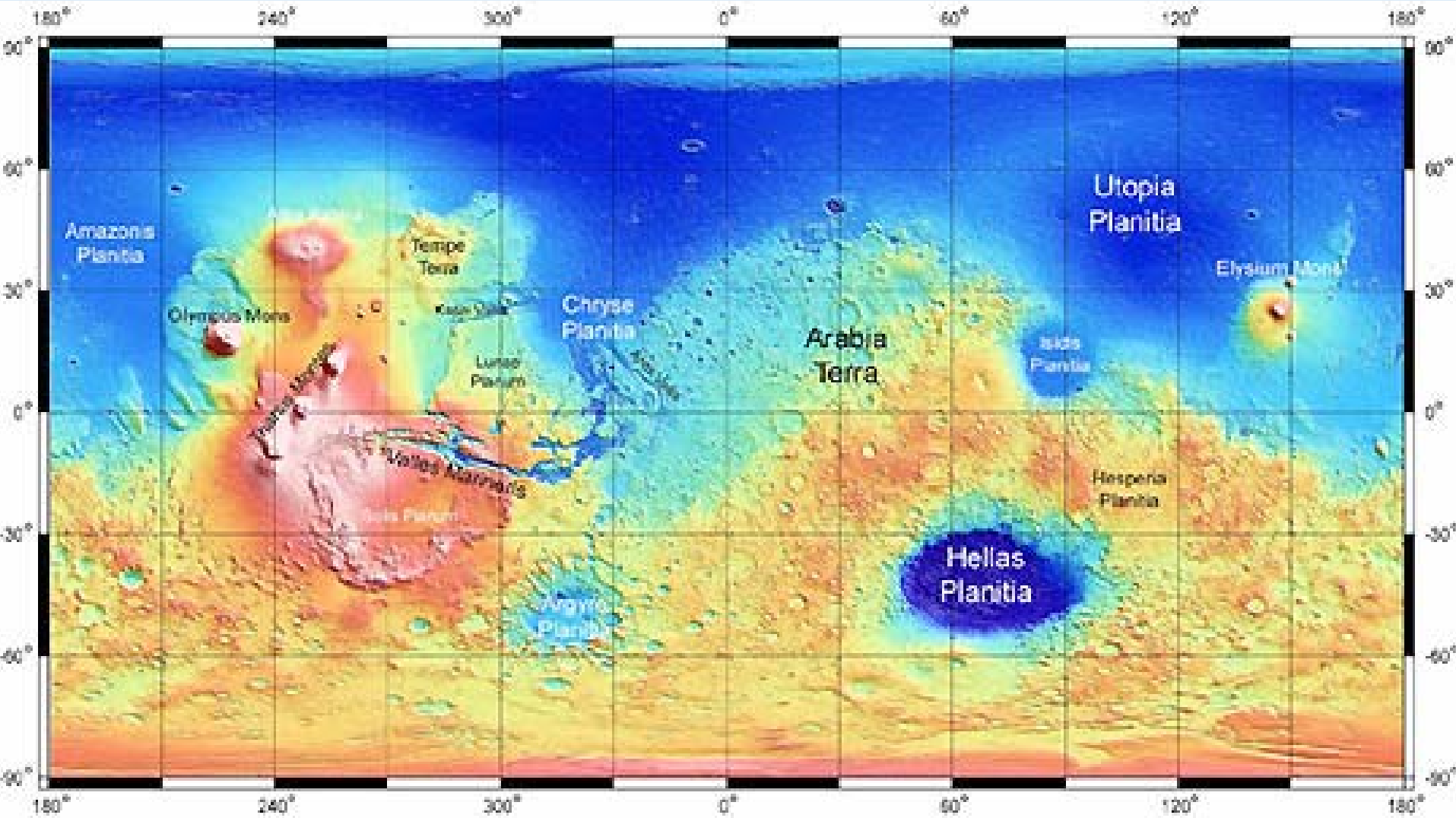
Motion enhanced



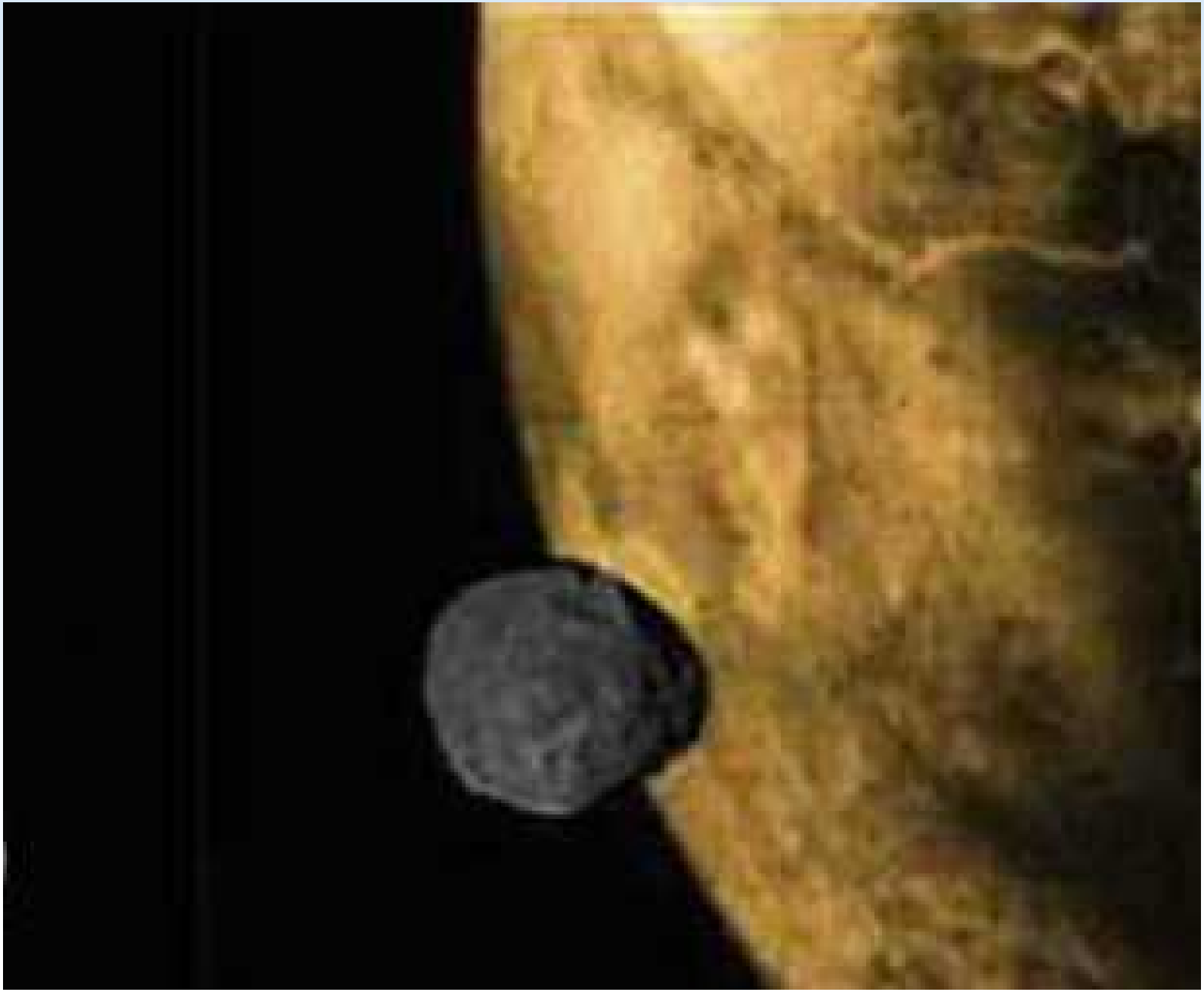
Terraforming Mars?



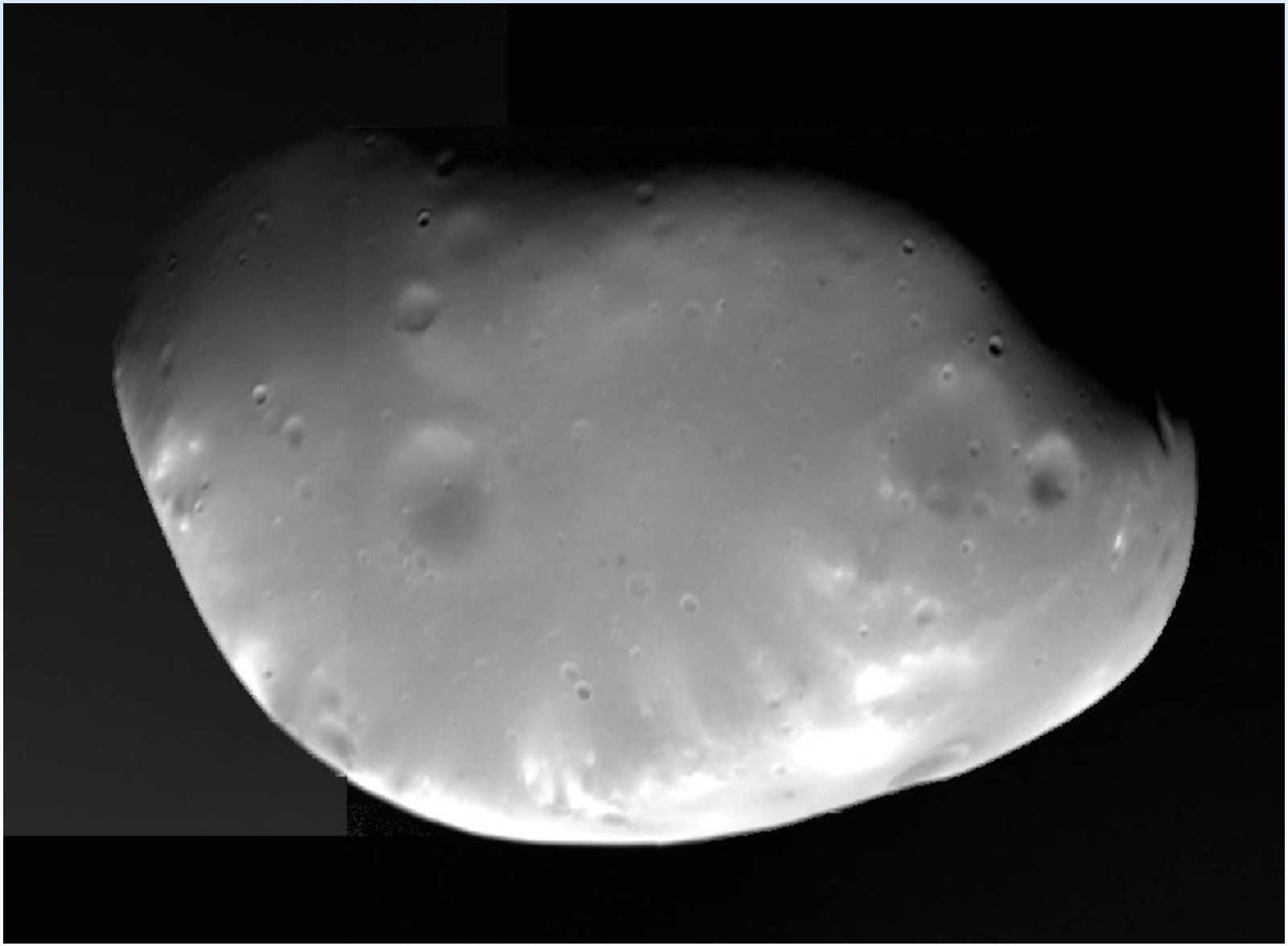
Mars



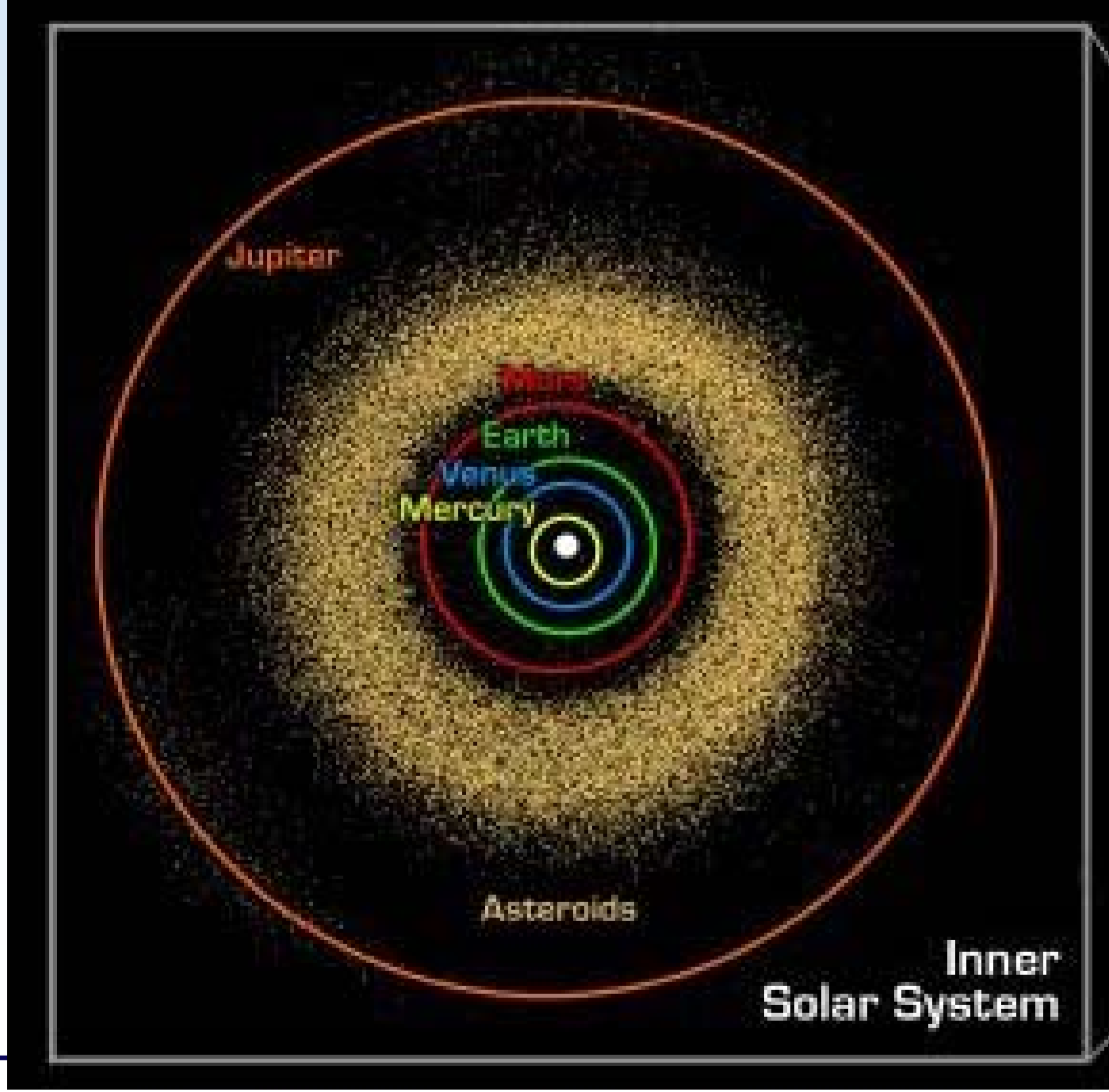
The MGS laser altimeter gives a good map of Mars

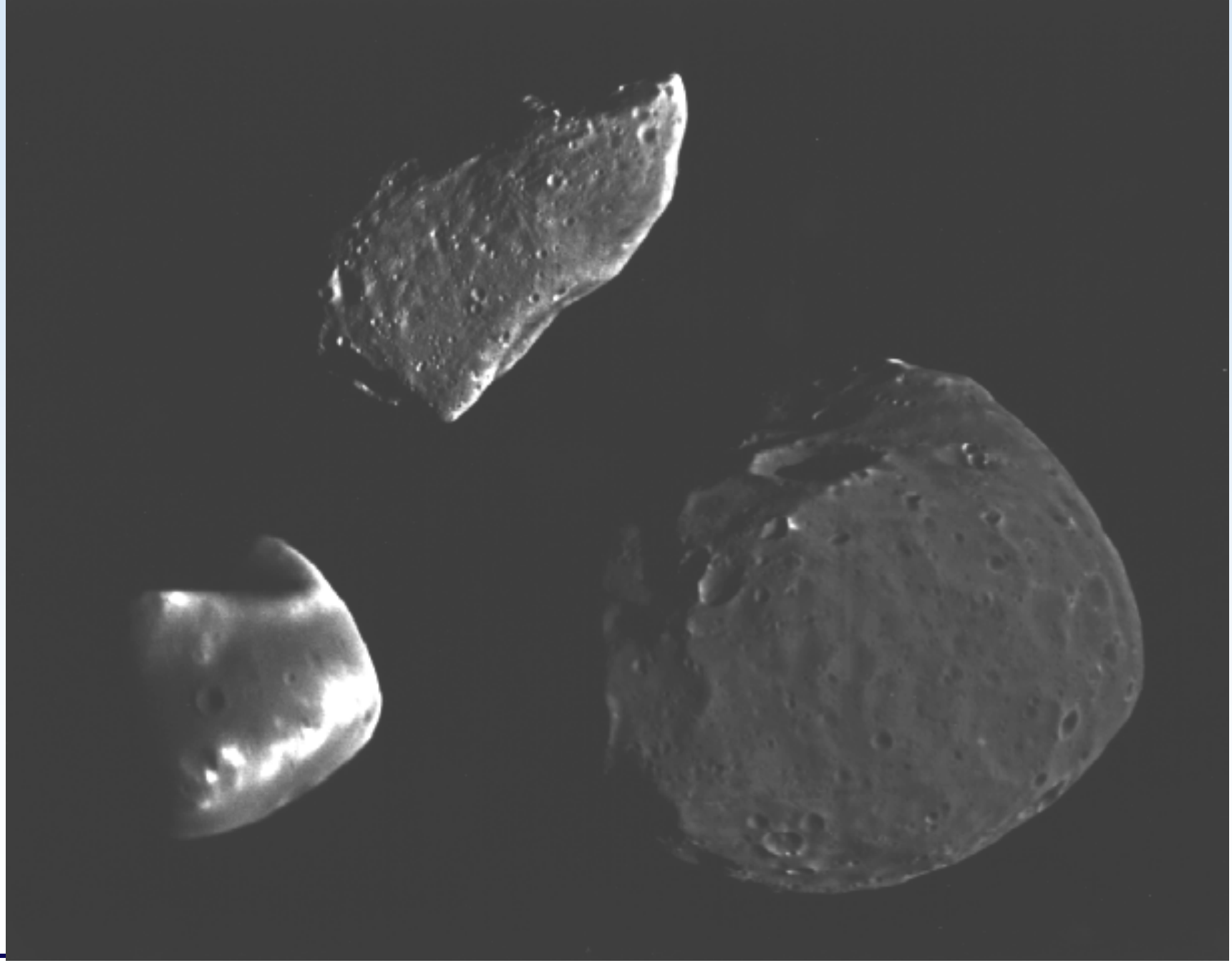


Phobos



Asteroid belt





Gaspra- 3-view



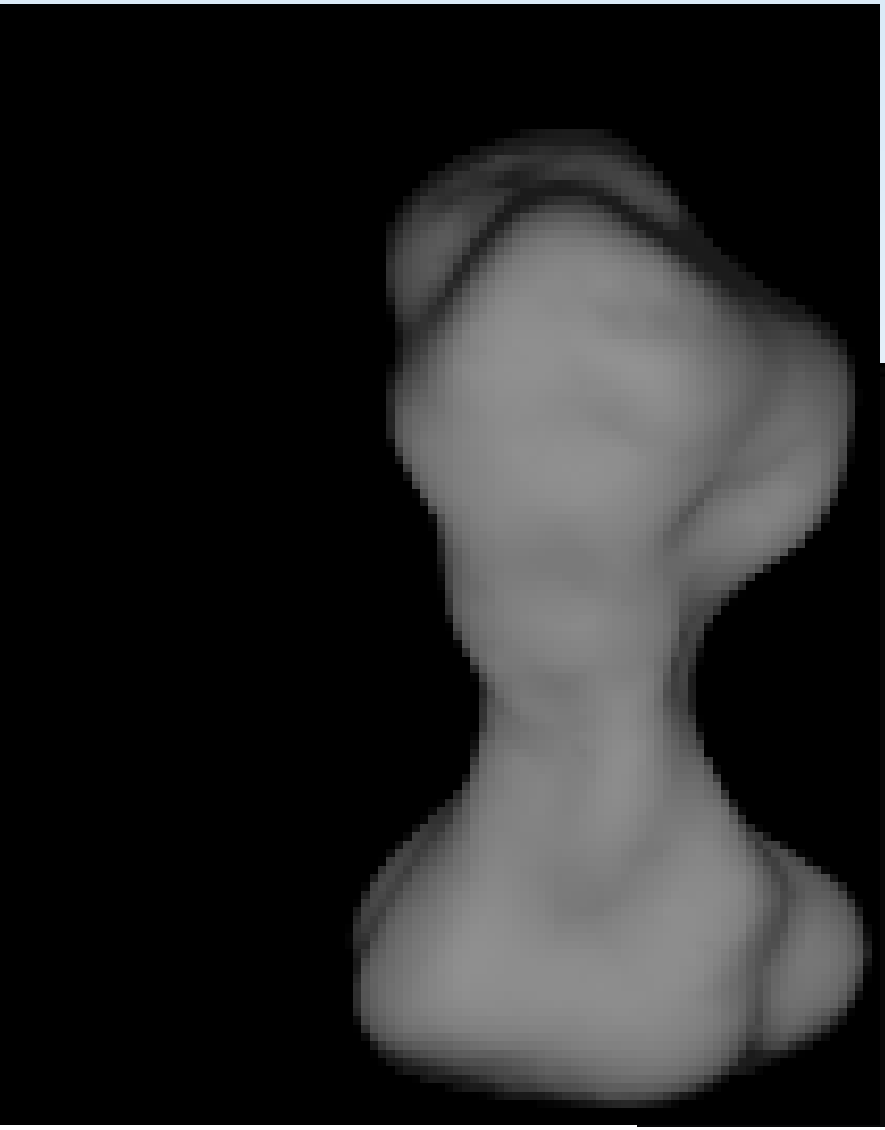
Gaspra- color

Asteroids



Ida & moon

Asteroids







Asteroids

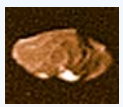
Jupiter



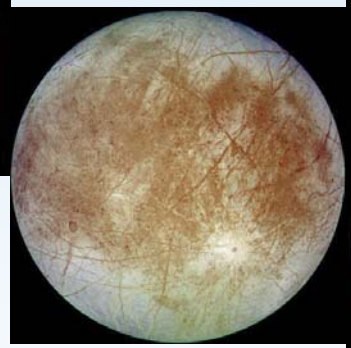
Geoffrey



Io



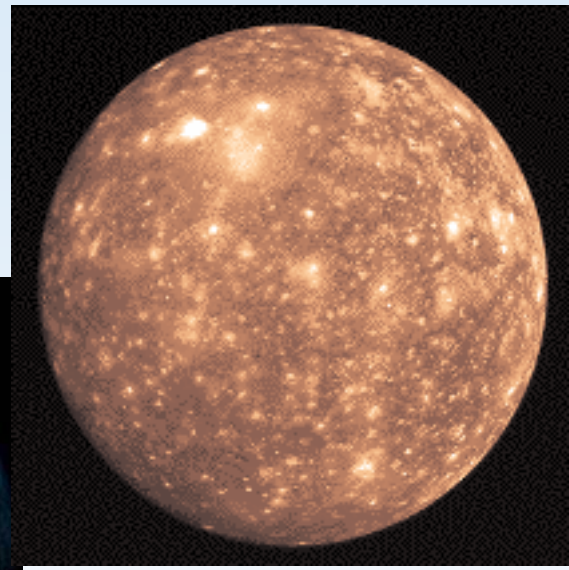
Amalthea



Europa

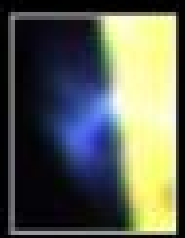


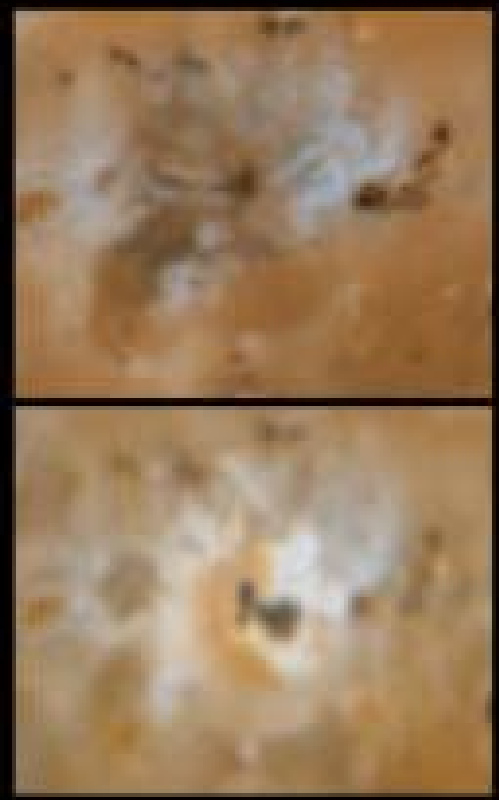
Ganymede

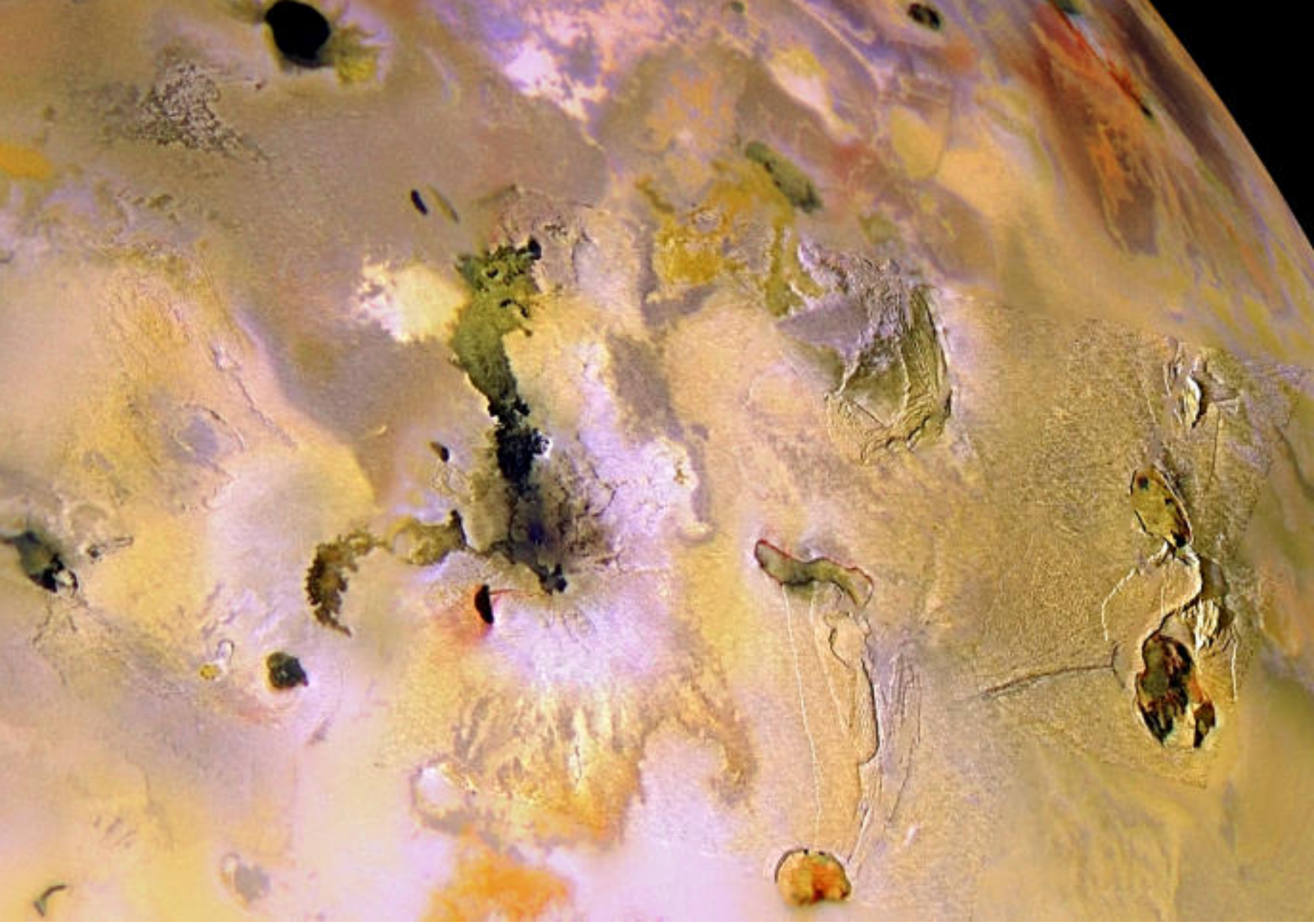


Callisto

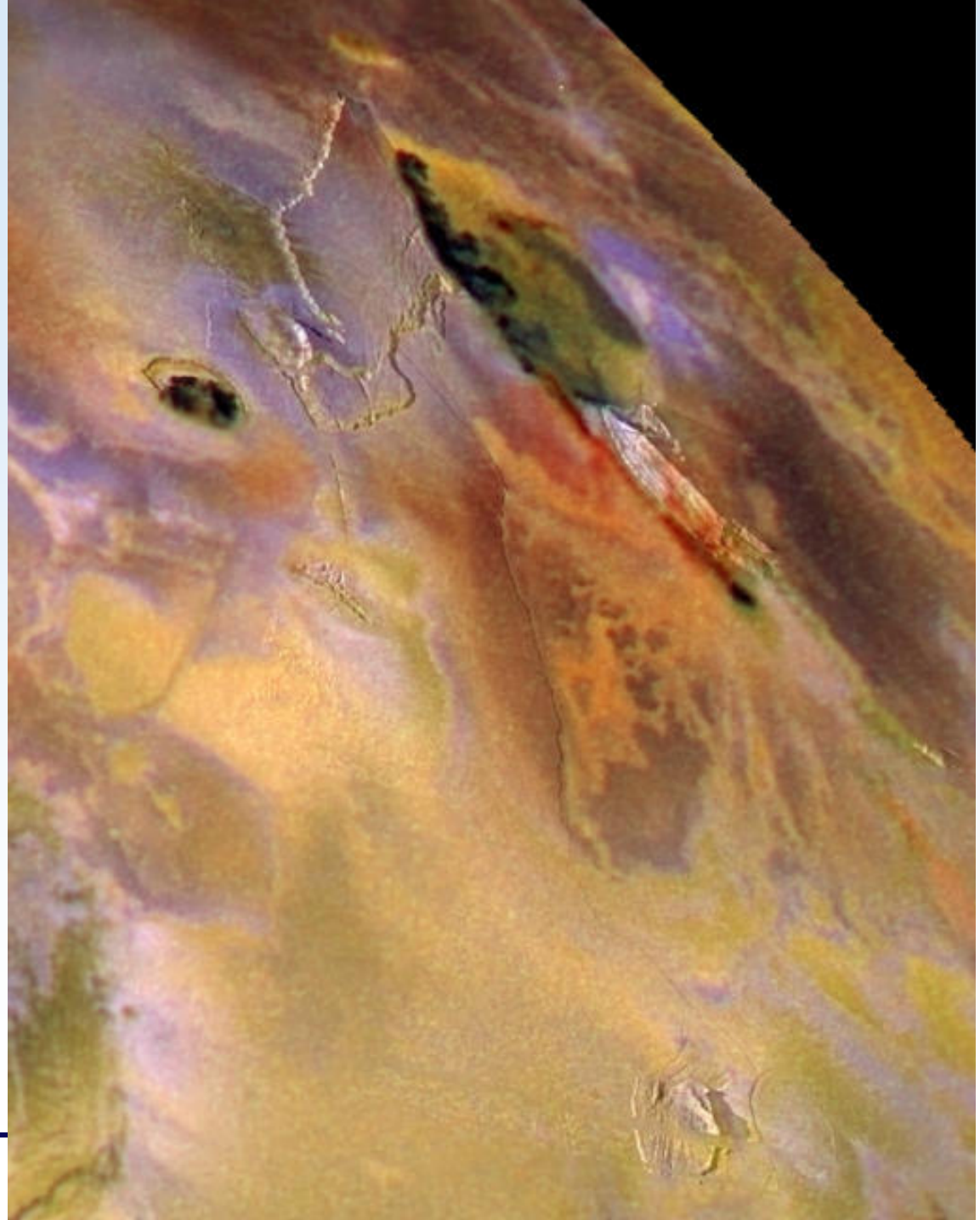
Jupiter's moons (roughly to scale)



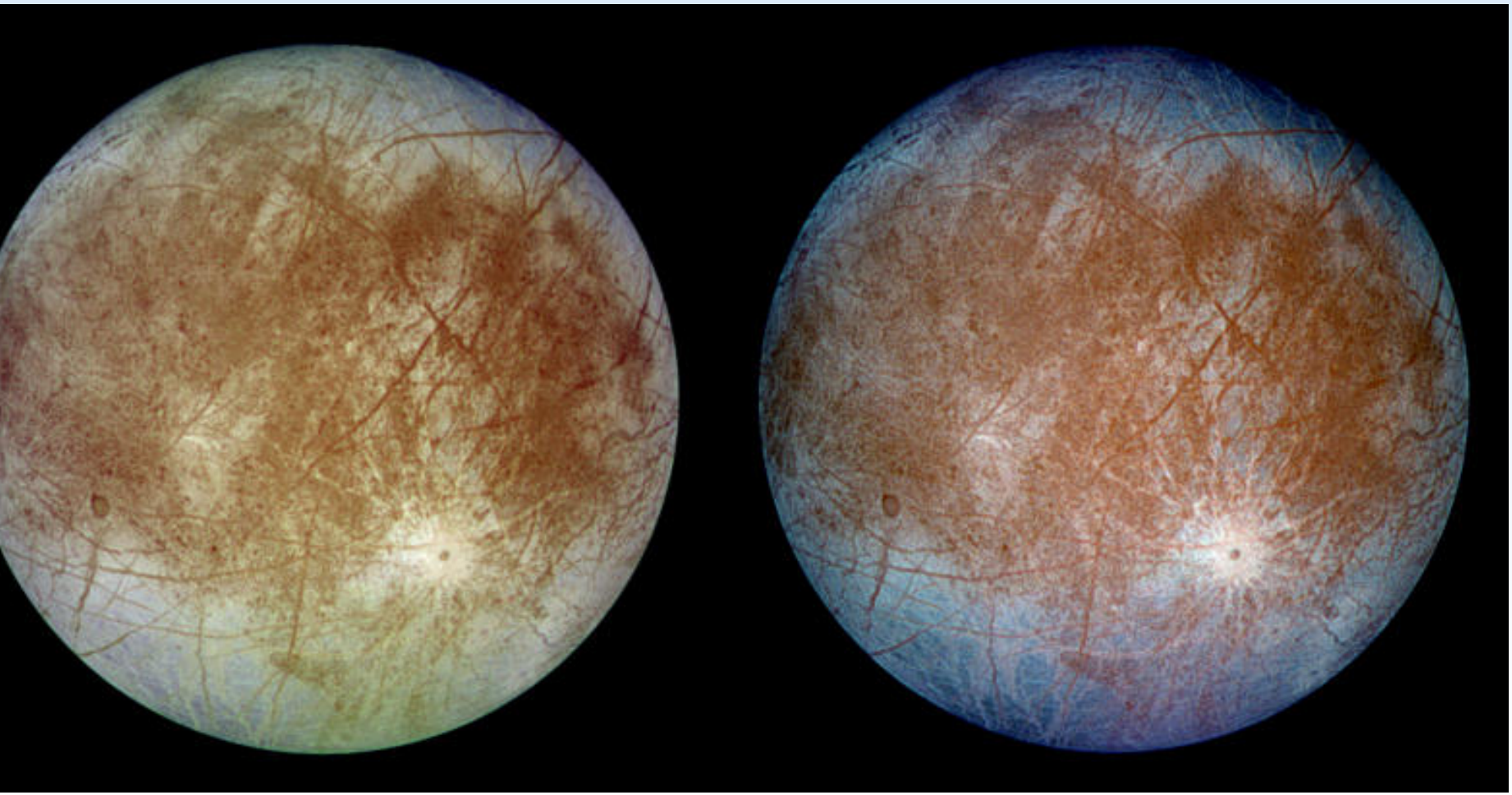




Io close-up:
Zal Patera region

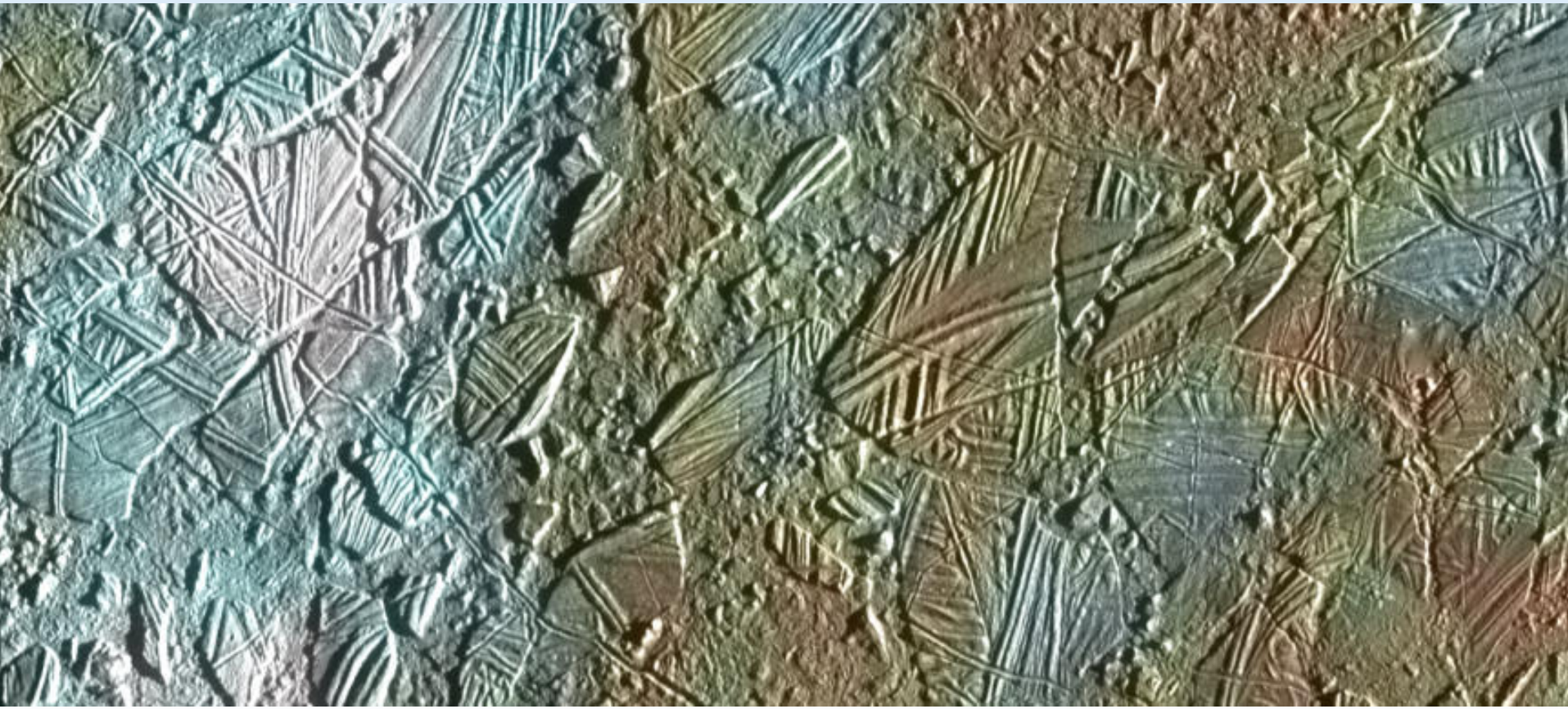


Europa

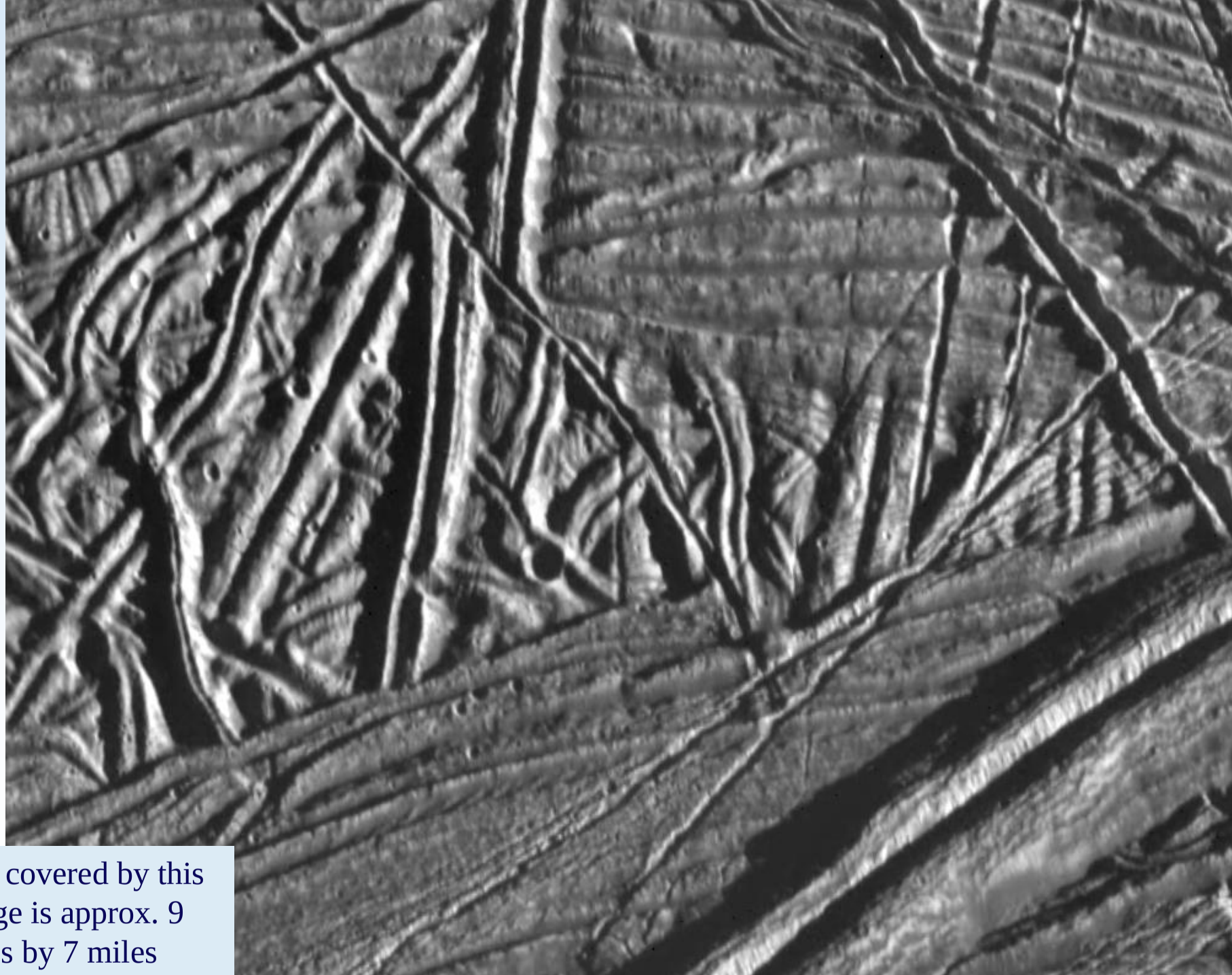



Europa

Europa ice

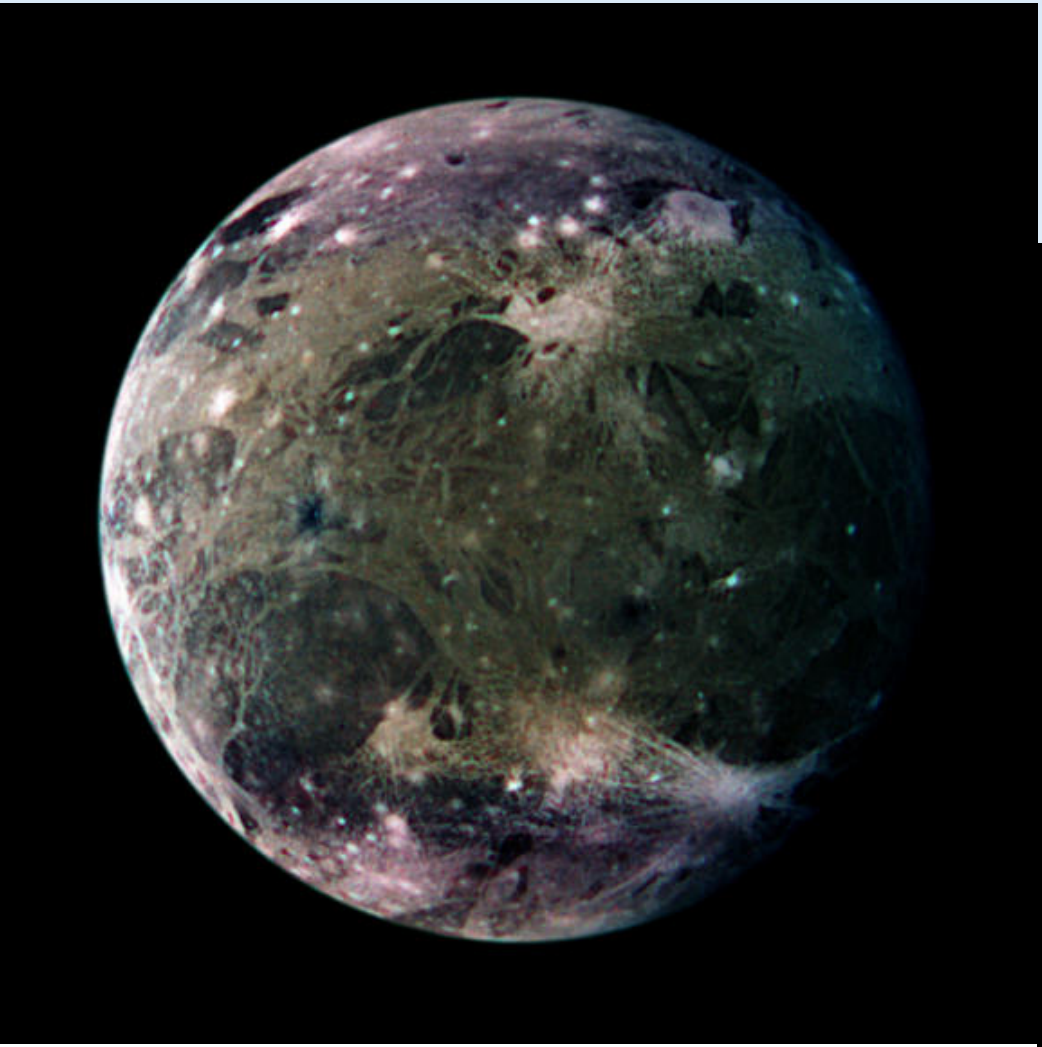


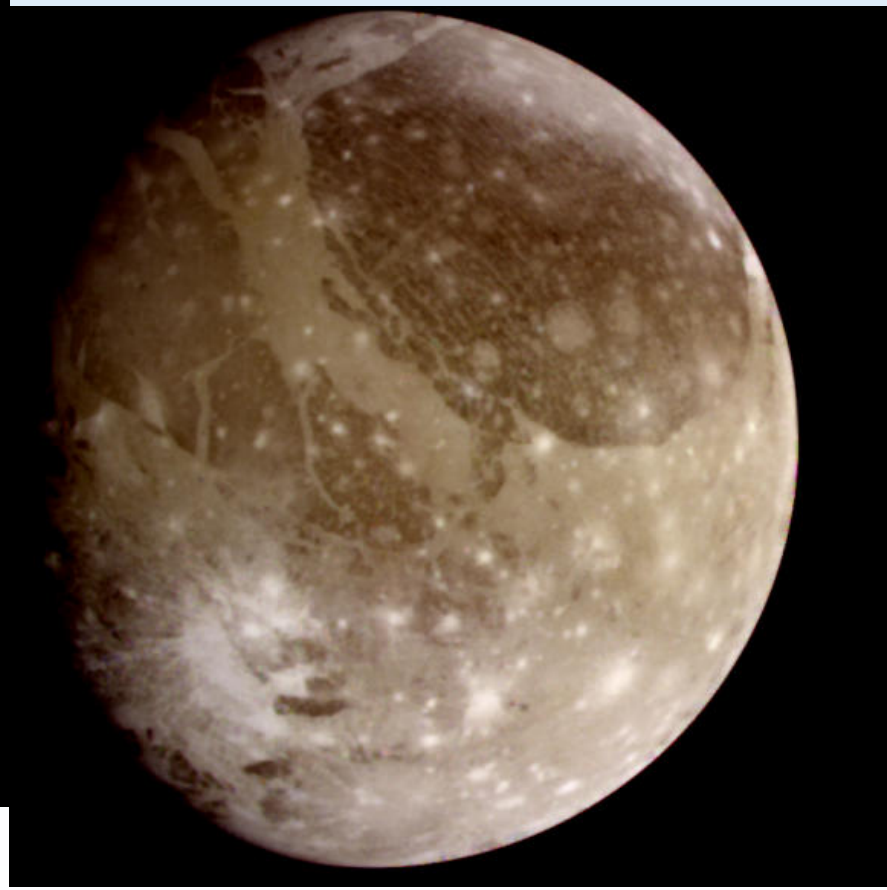
The colors in this picture have been enhanced for visibility.



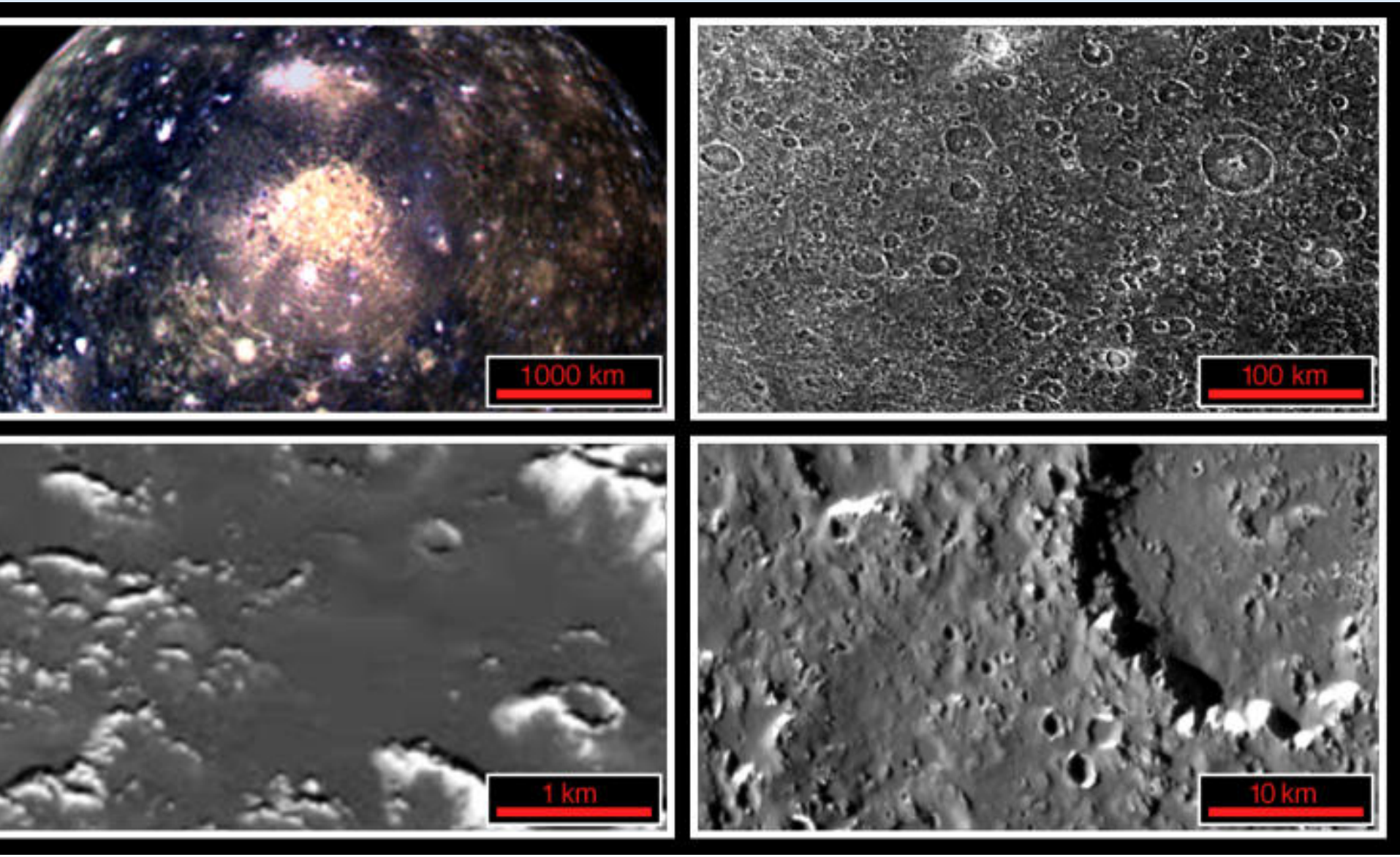
area covered by this image is approx. 9 miles by 7 miles

Ganymede





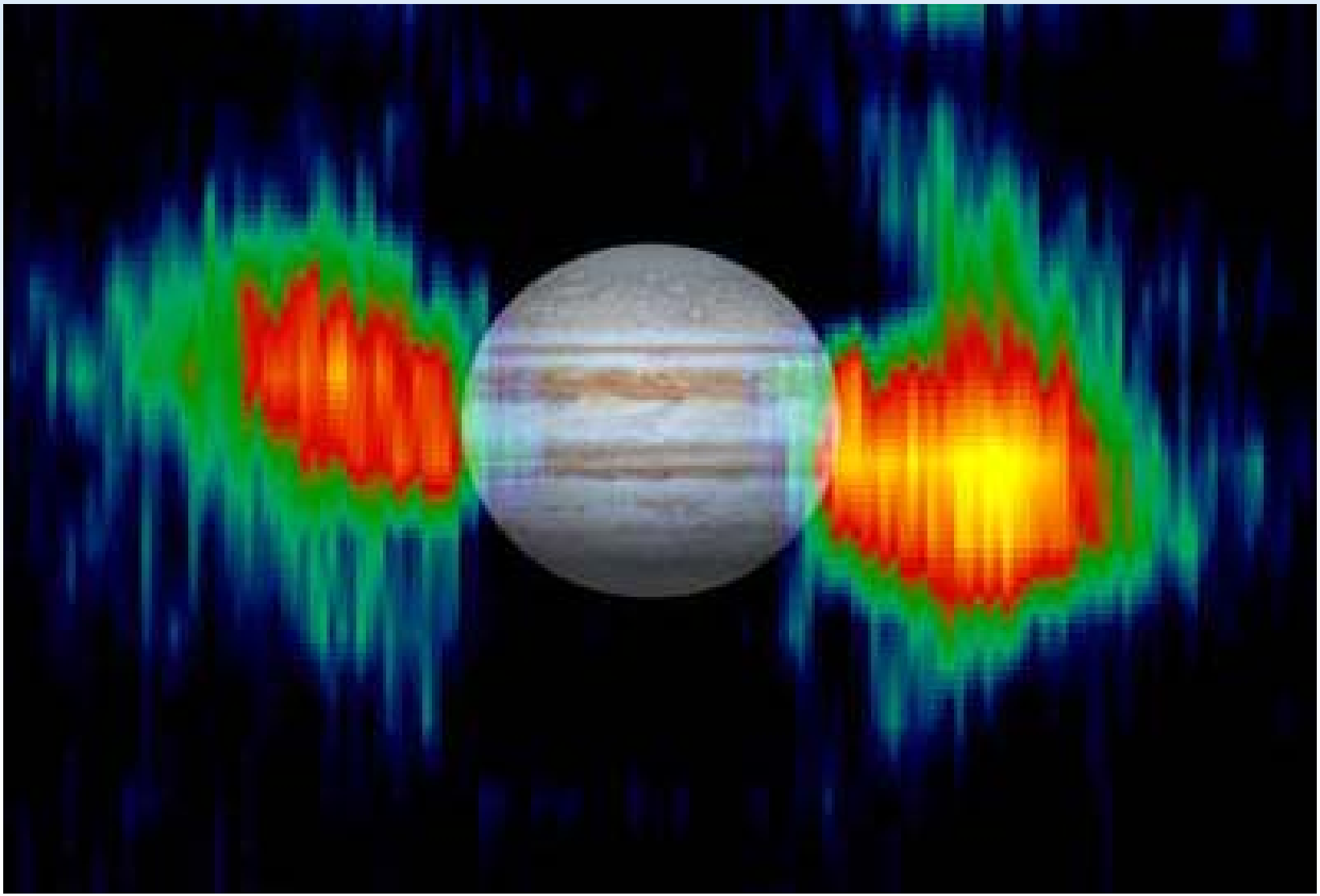
Callisto





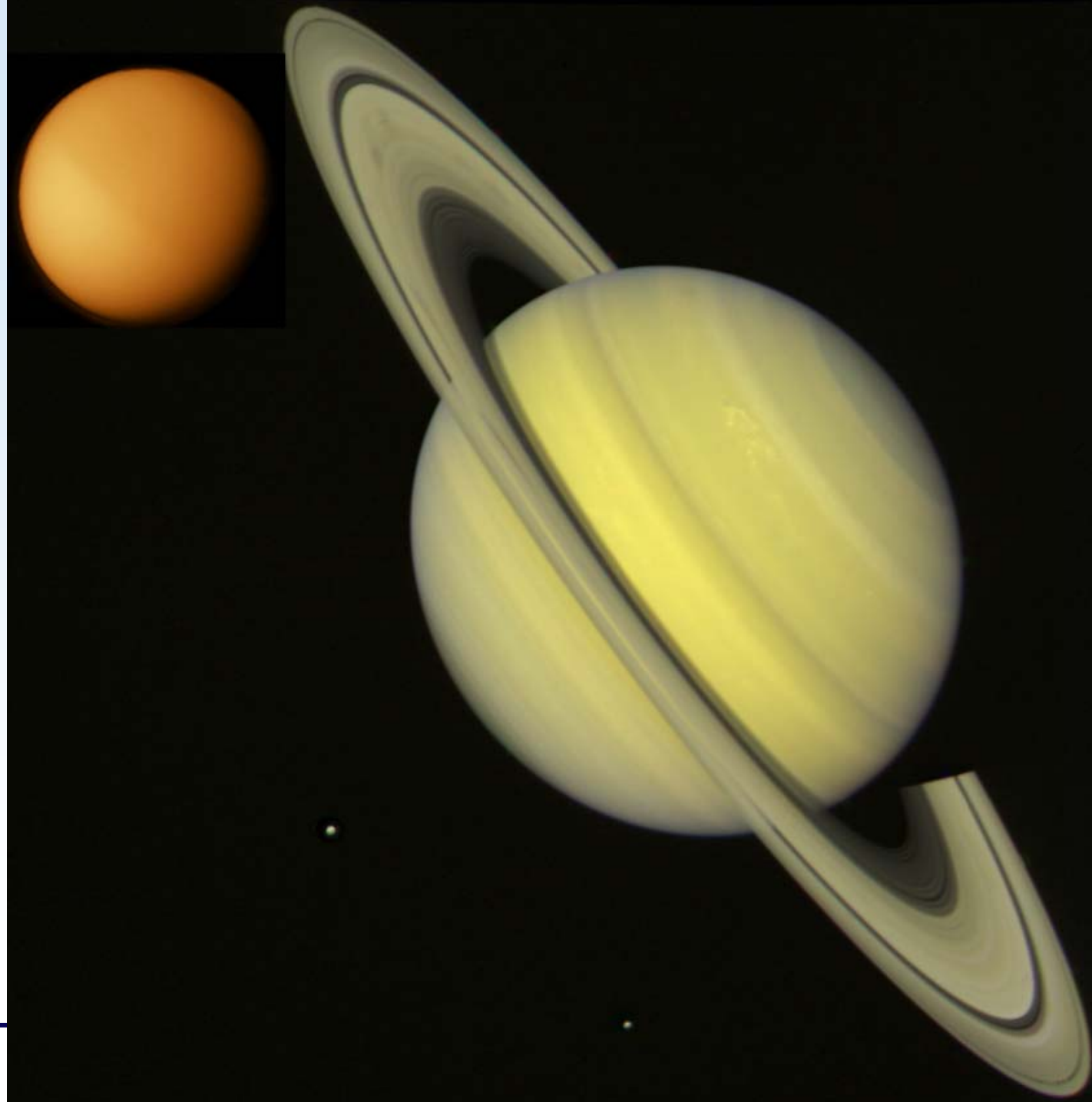
Human mission to Callisto

the Van Allen belts of Jupiter (shown to scale)

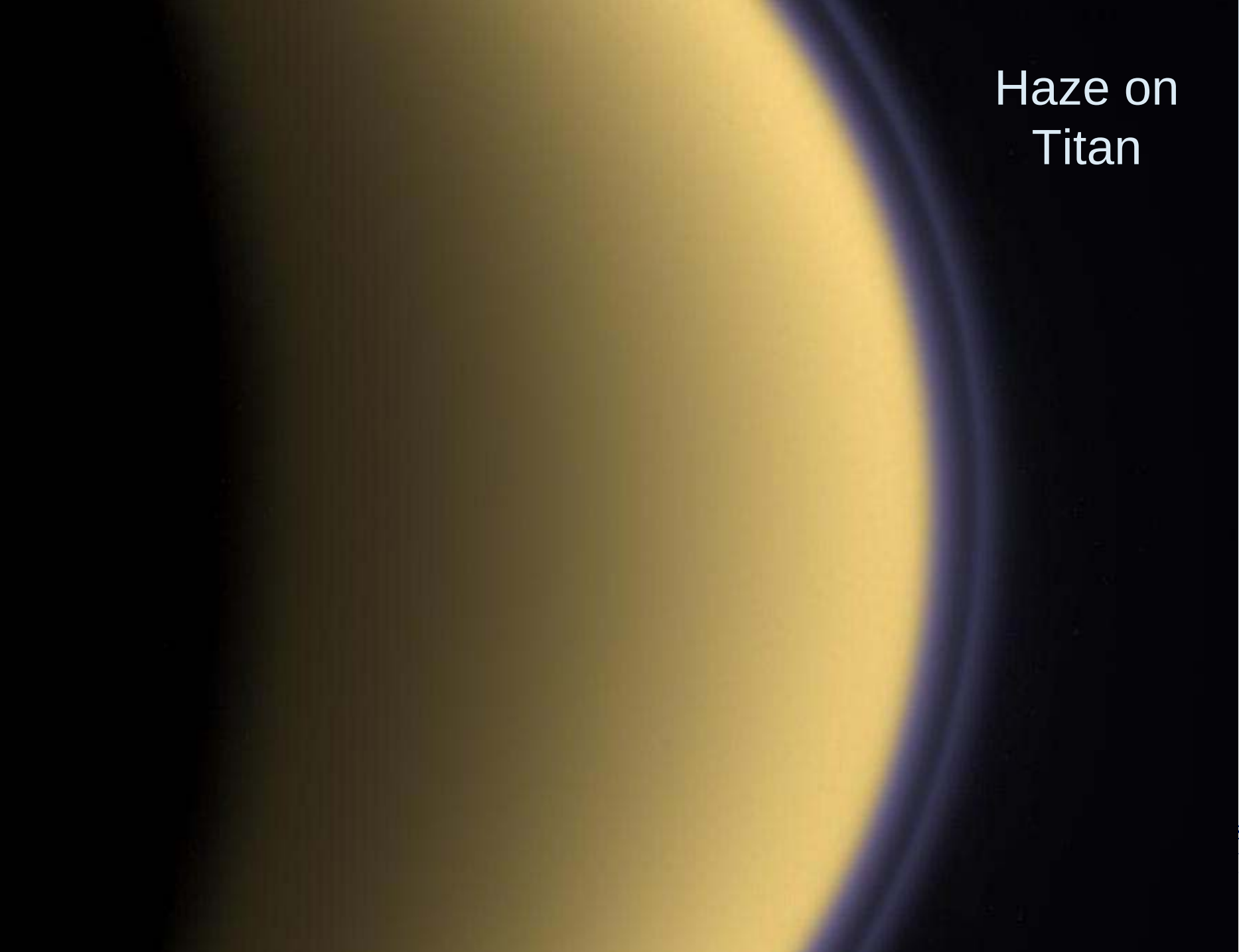


Jupiter's inner radiation belts marked out by radio emissions from relativistic electrons

Saturn & Titan

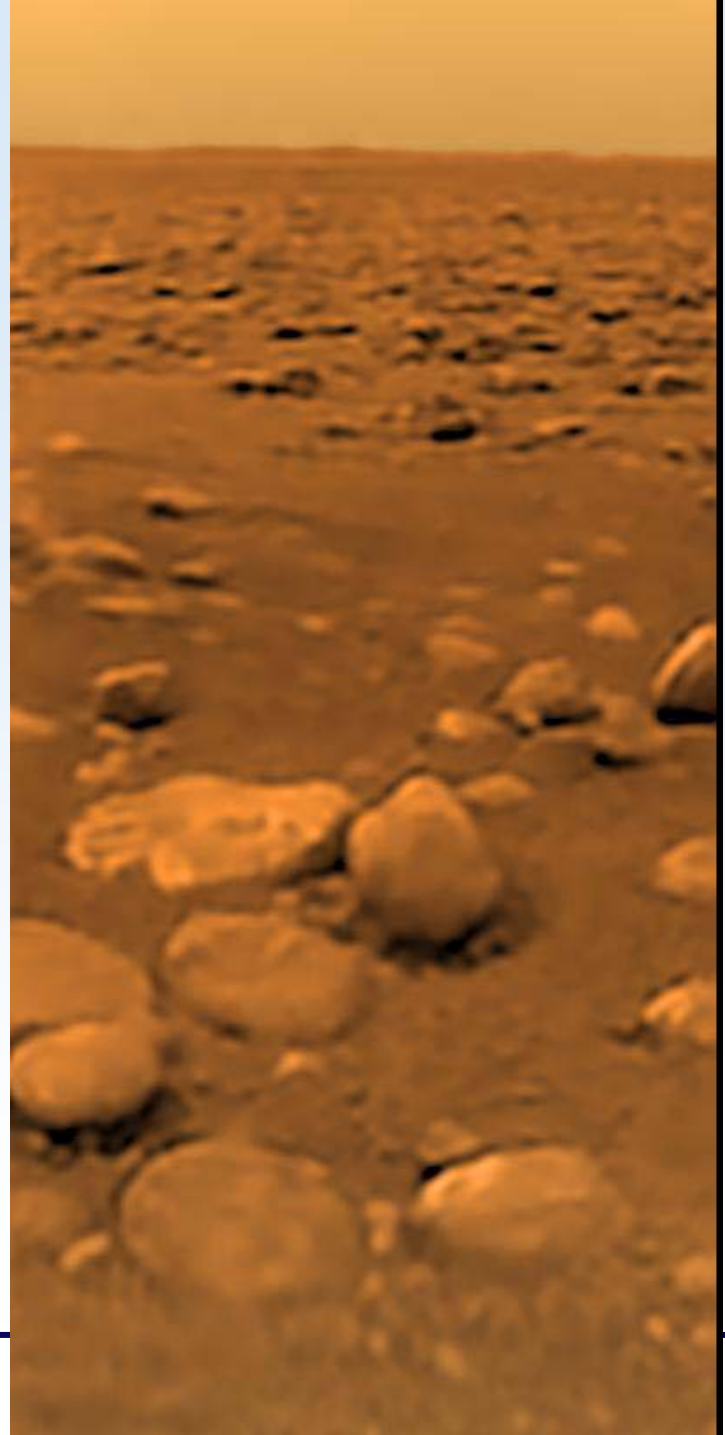


Geoffrey A. Landis



Haze on Titan

Titan surface



Titan viewed from Huygens

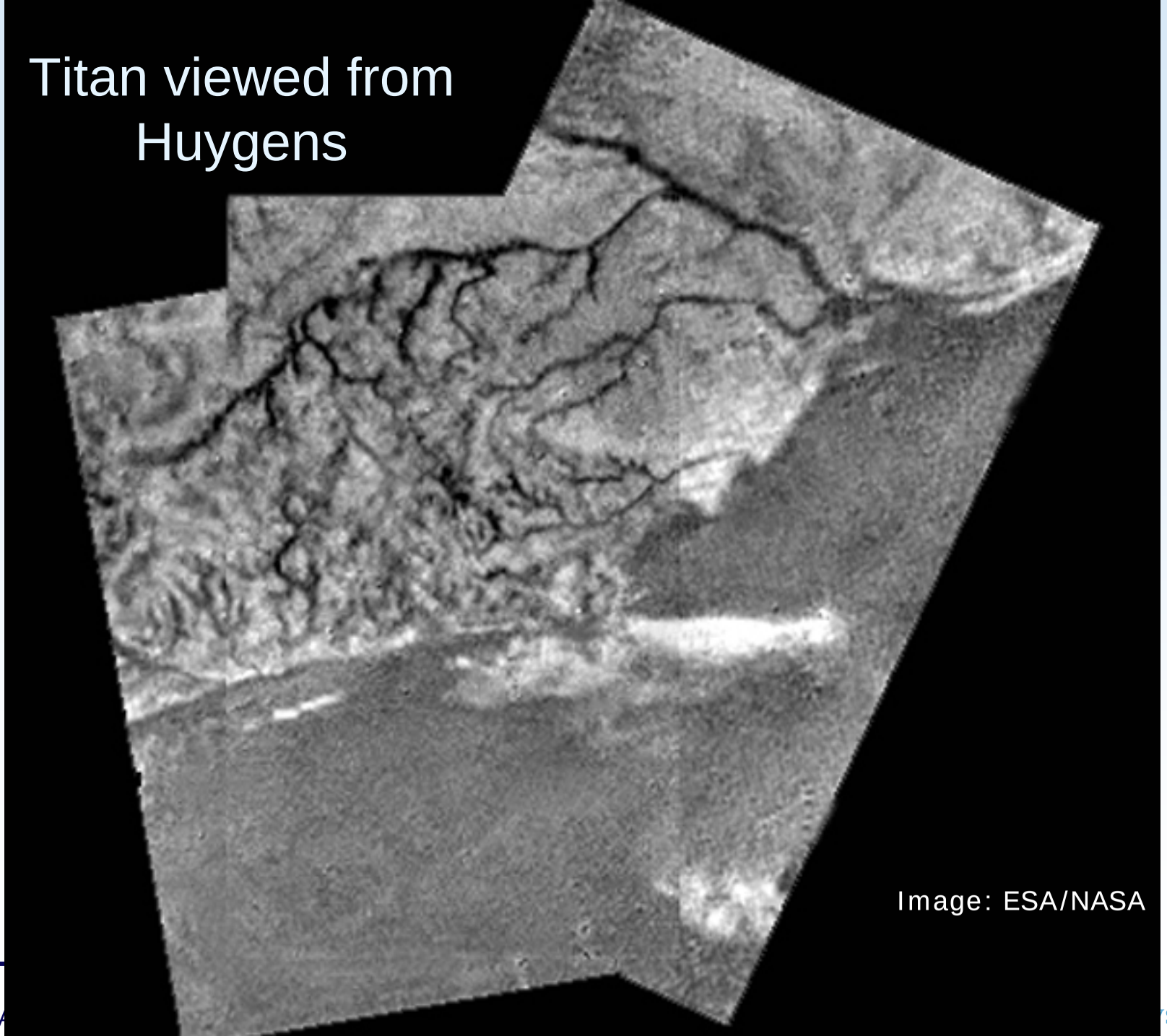
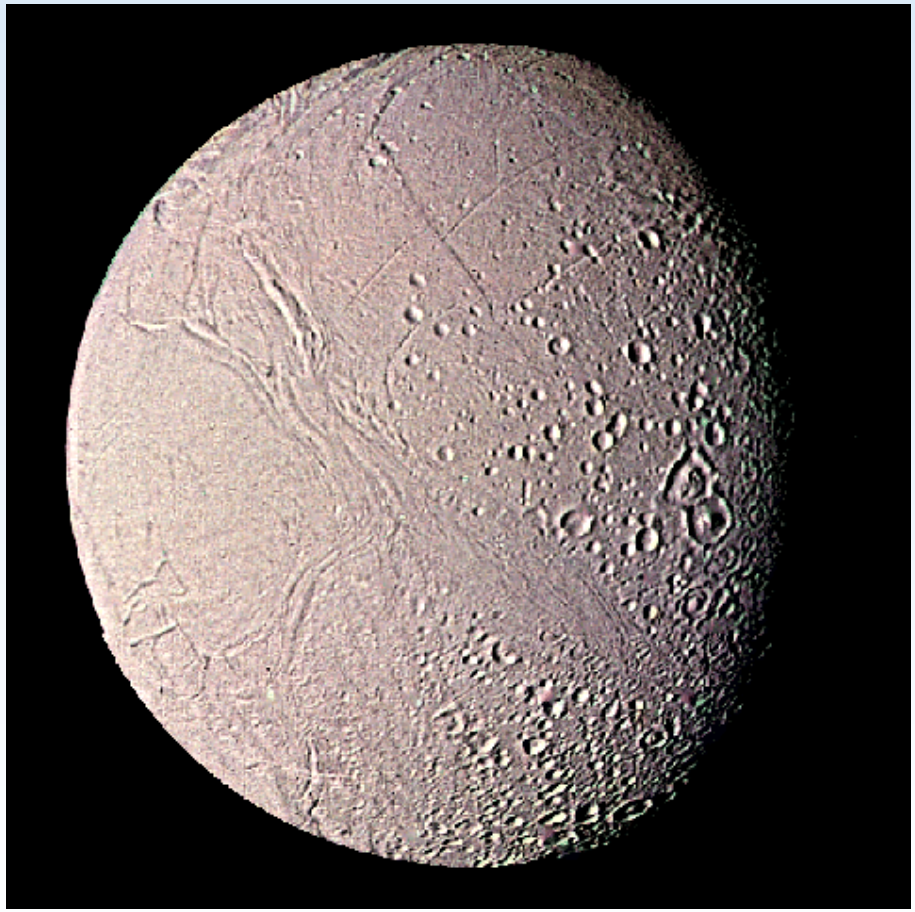
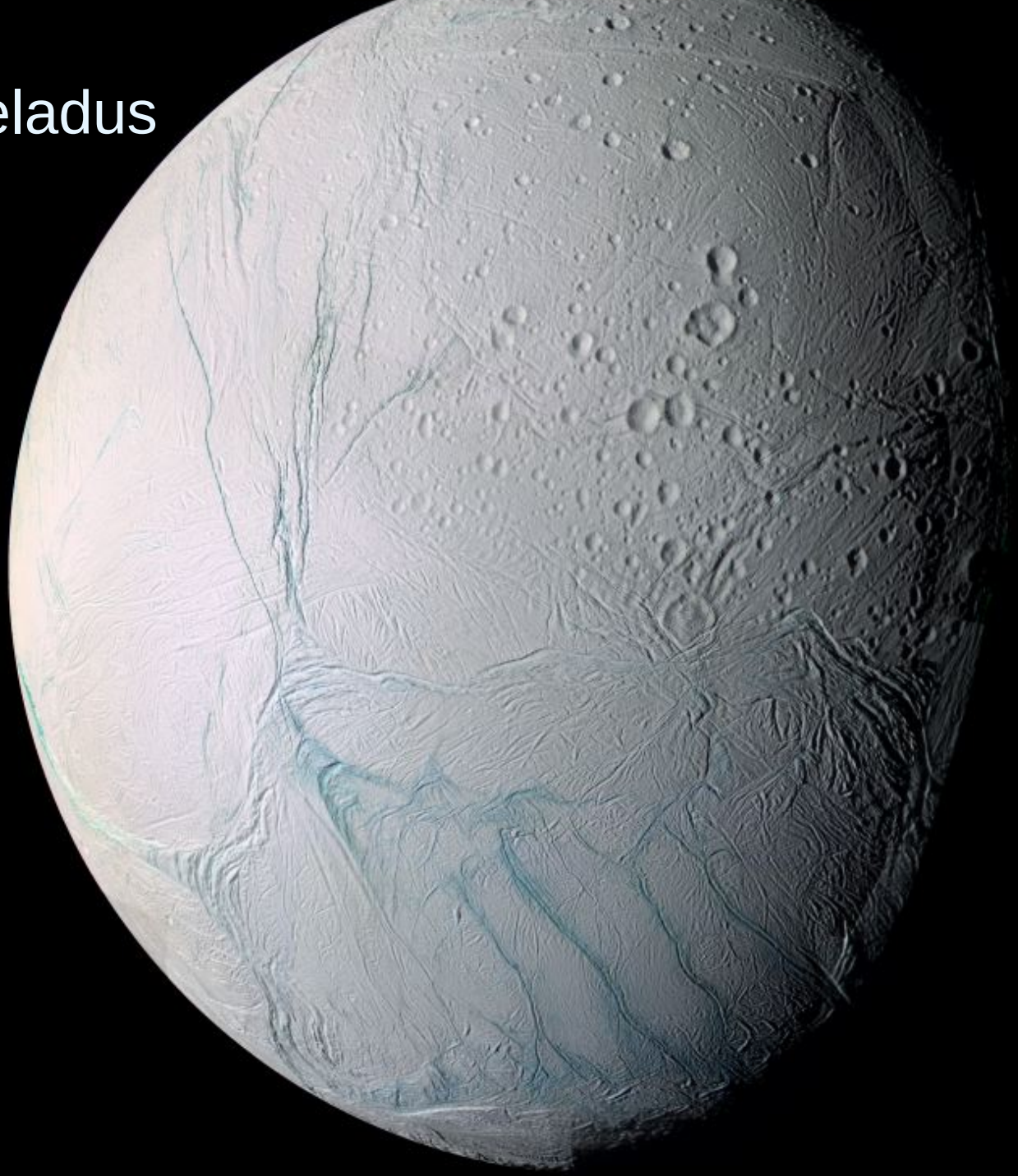


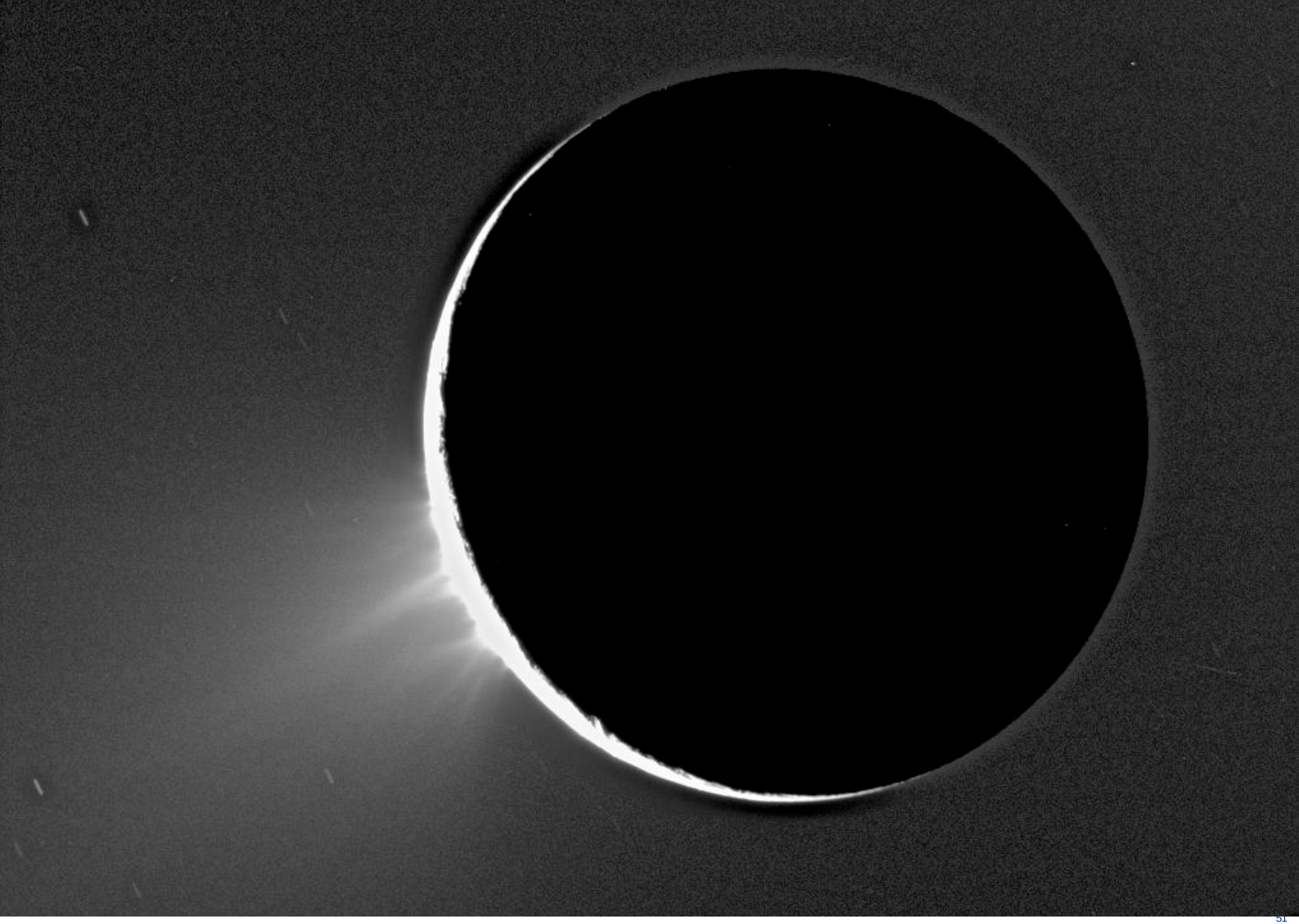
Image: ESA/NASA

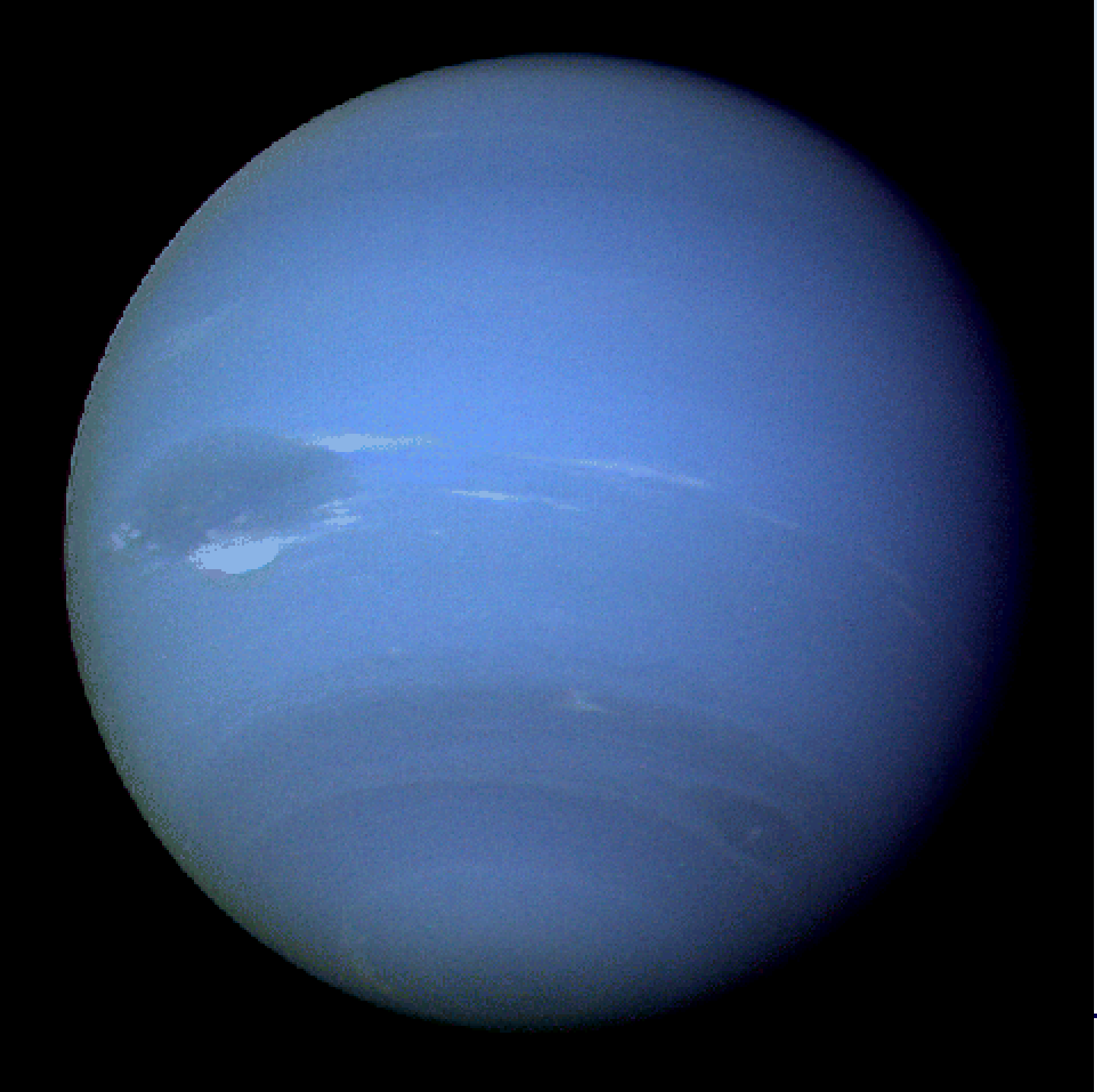
Enceladus



Enceladus

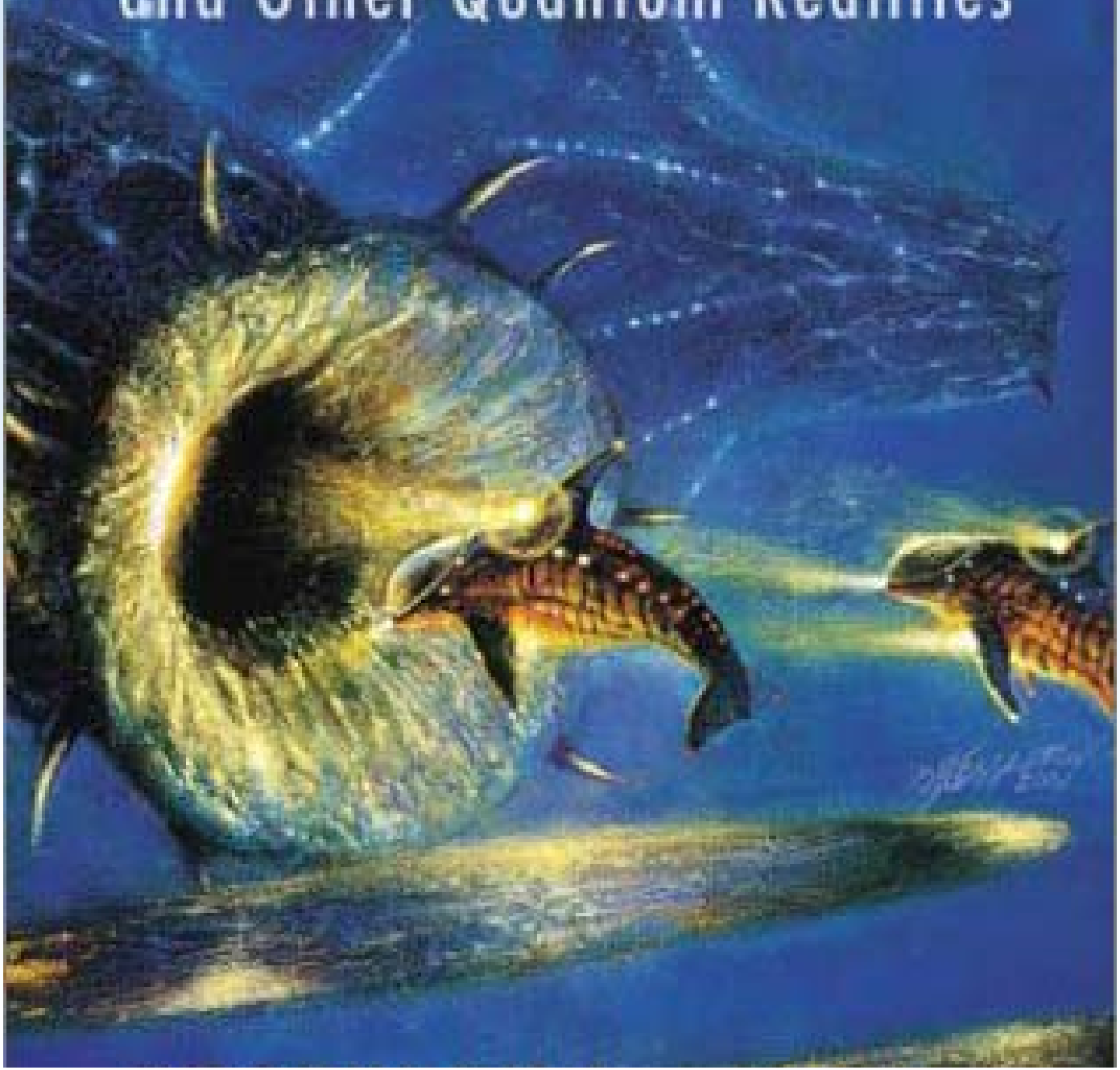




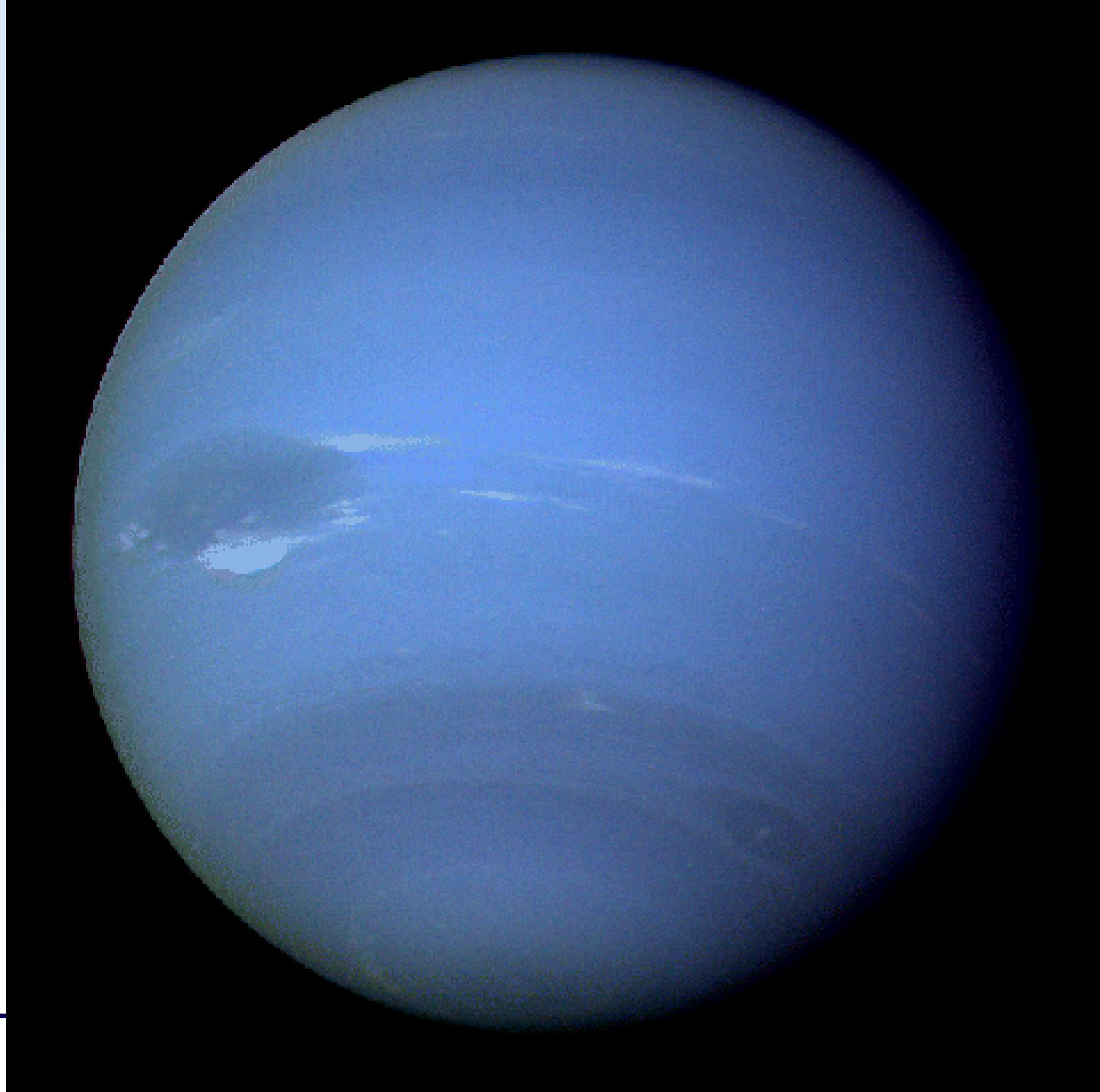


Outer planets ("water giants")

Neptune's great dark spot

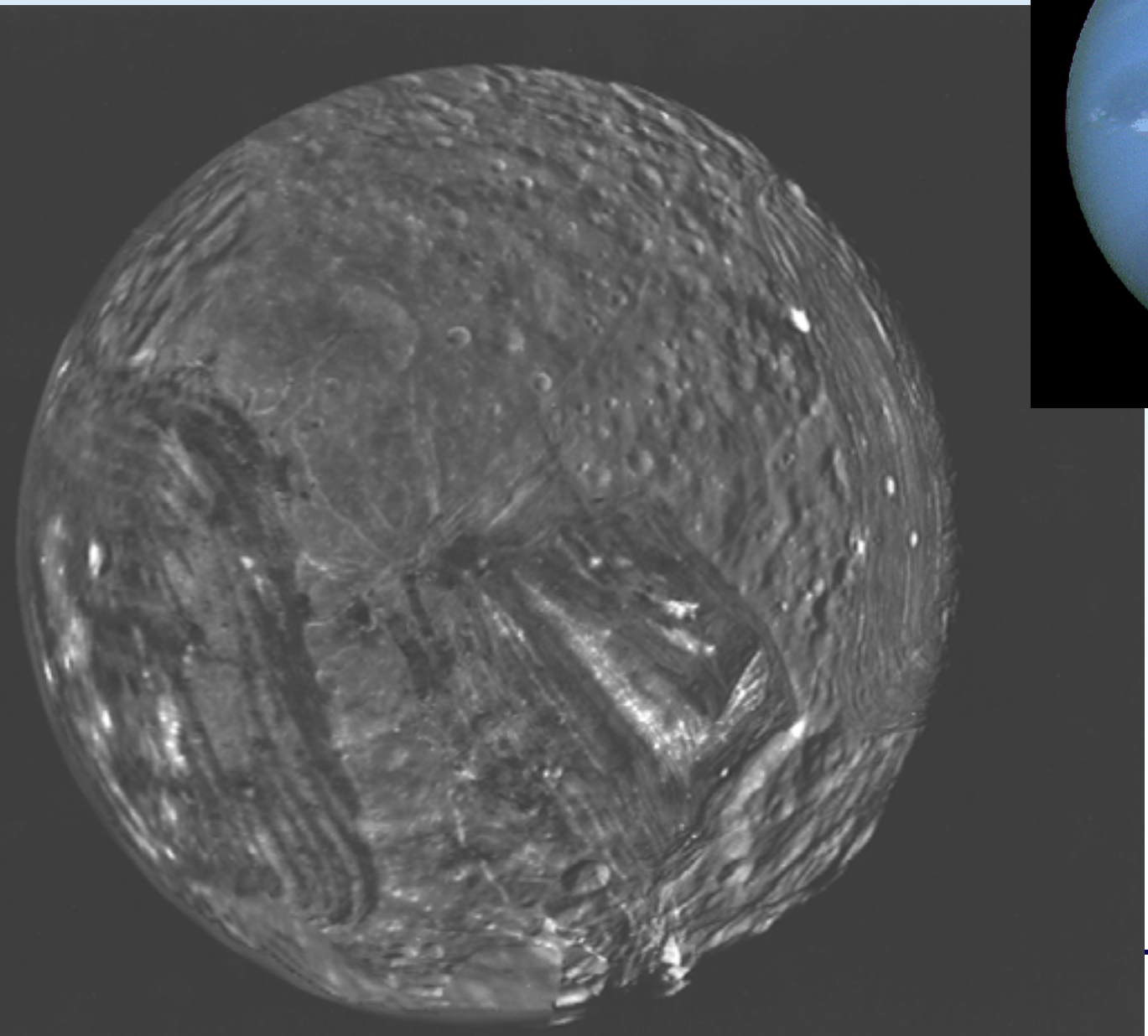

and Other Quantum Realities

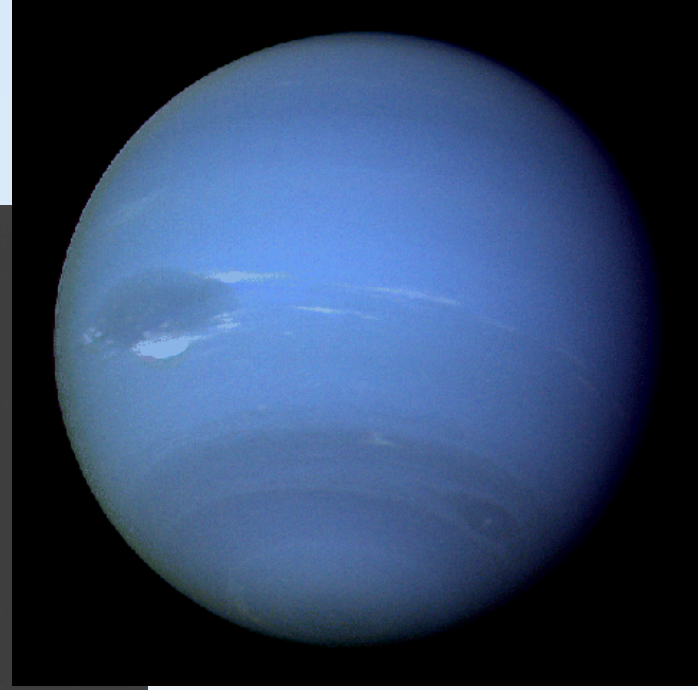
Neptune



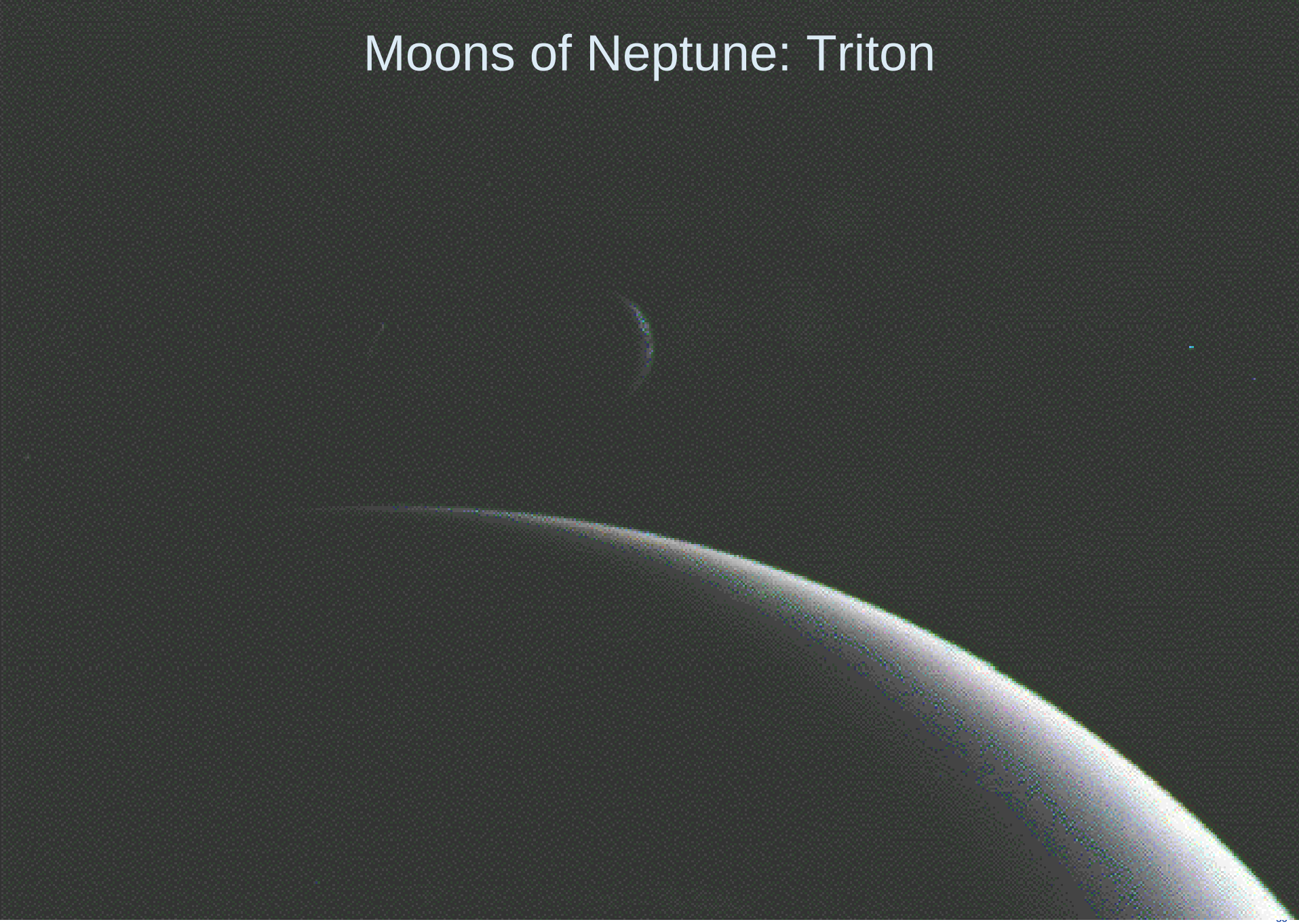
Geoffrey A. Landis

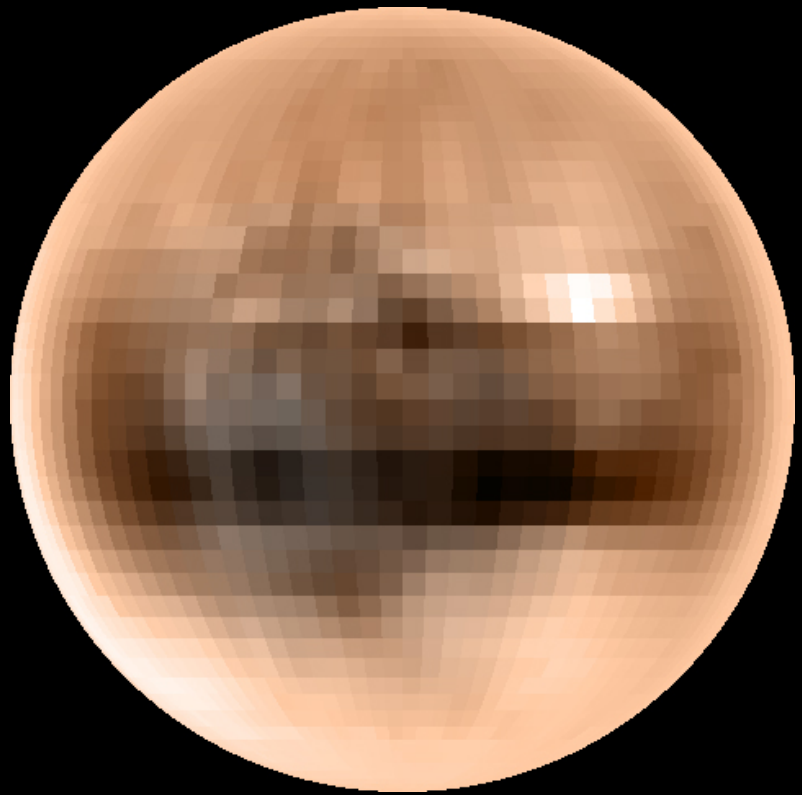
Moons of Neptune: Miranda





Moons of Neptune: Triton





Pluto

approximate true color

Pluto & three moons: Charon, Nix and Hydra

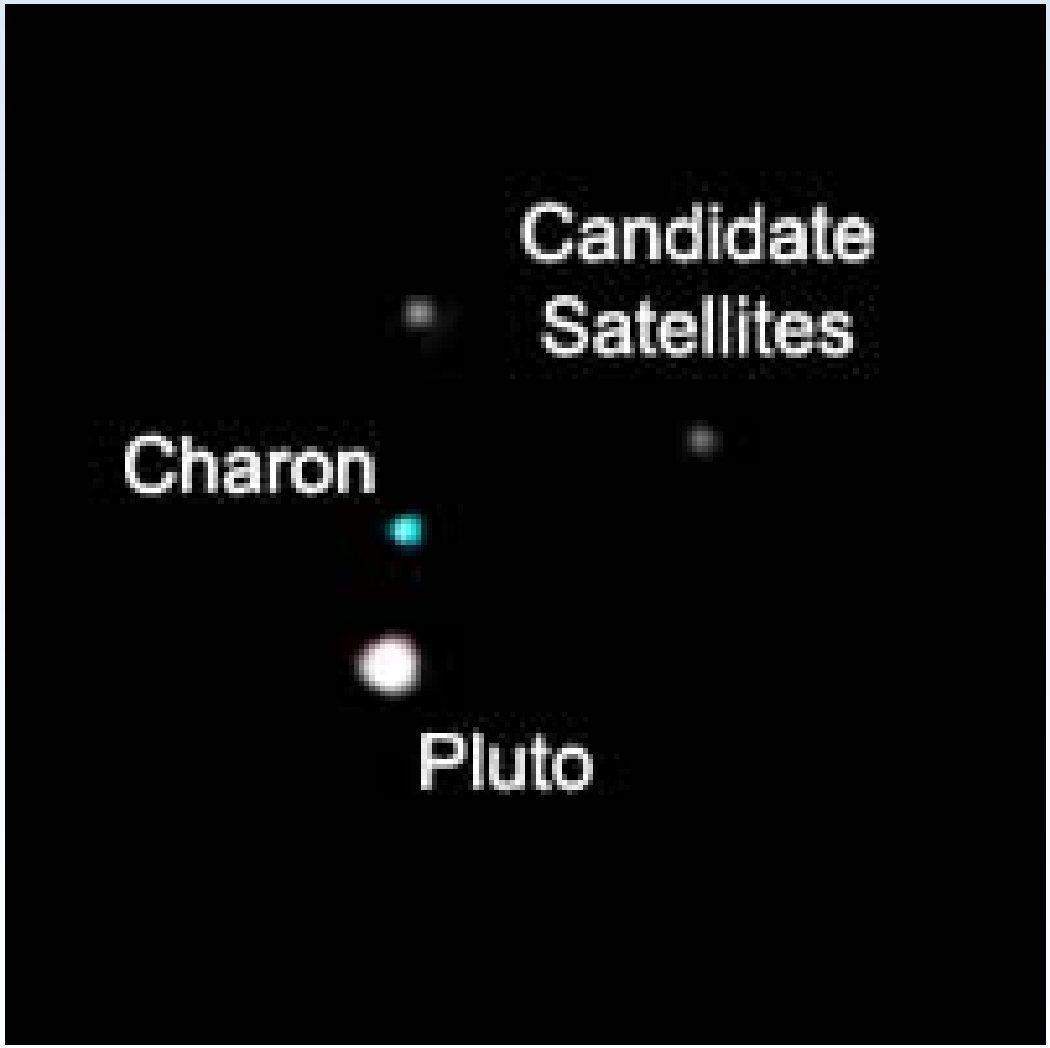
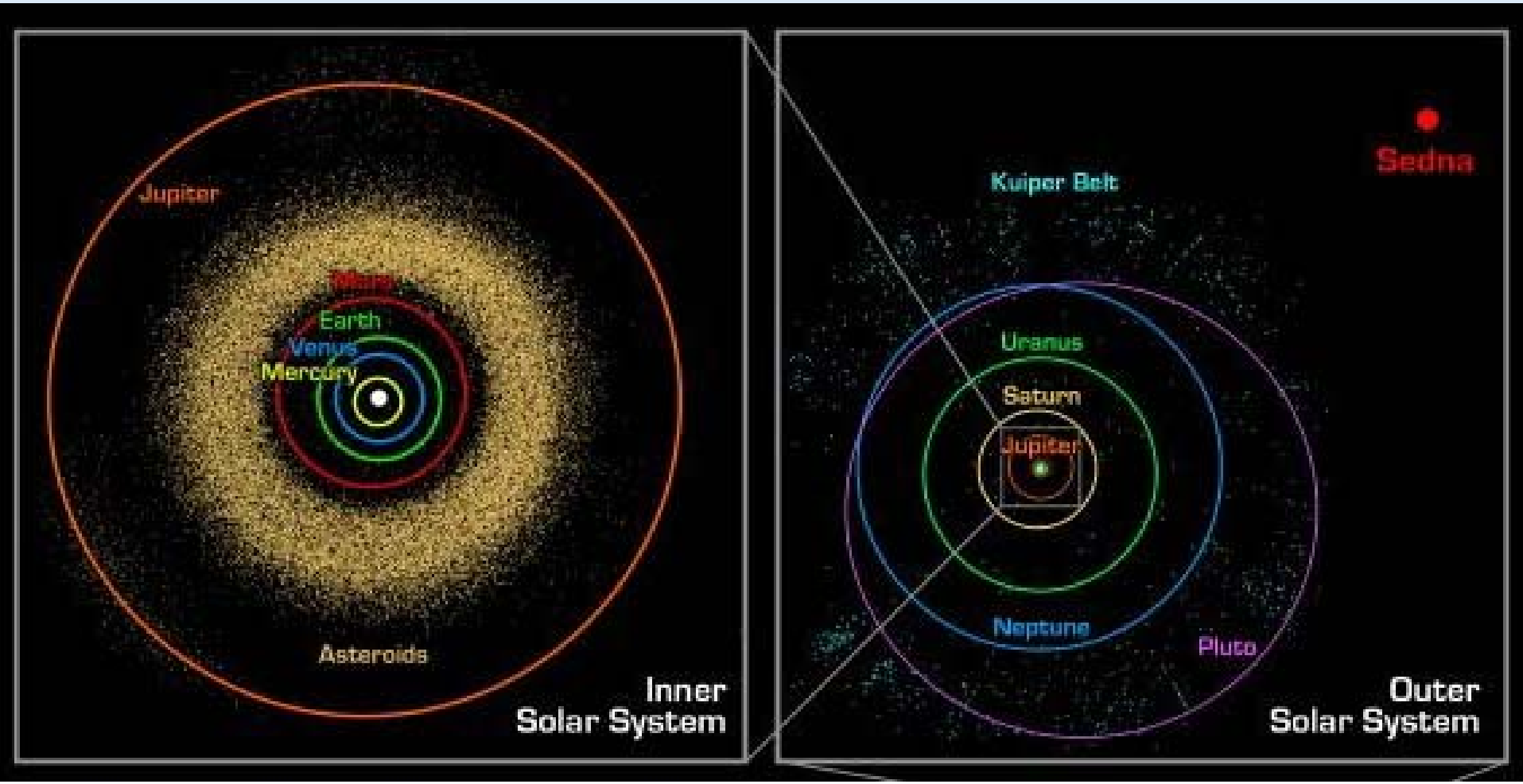


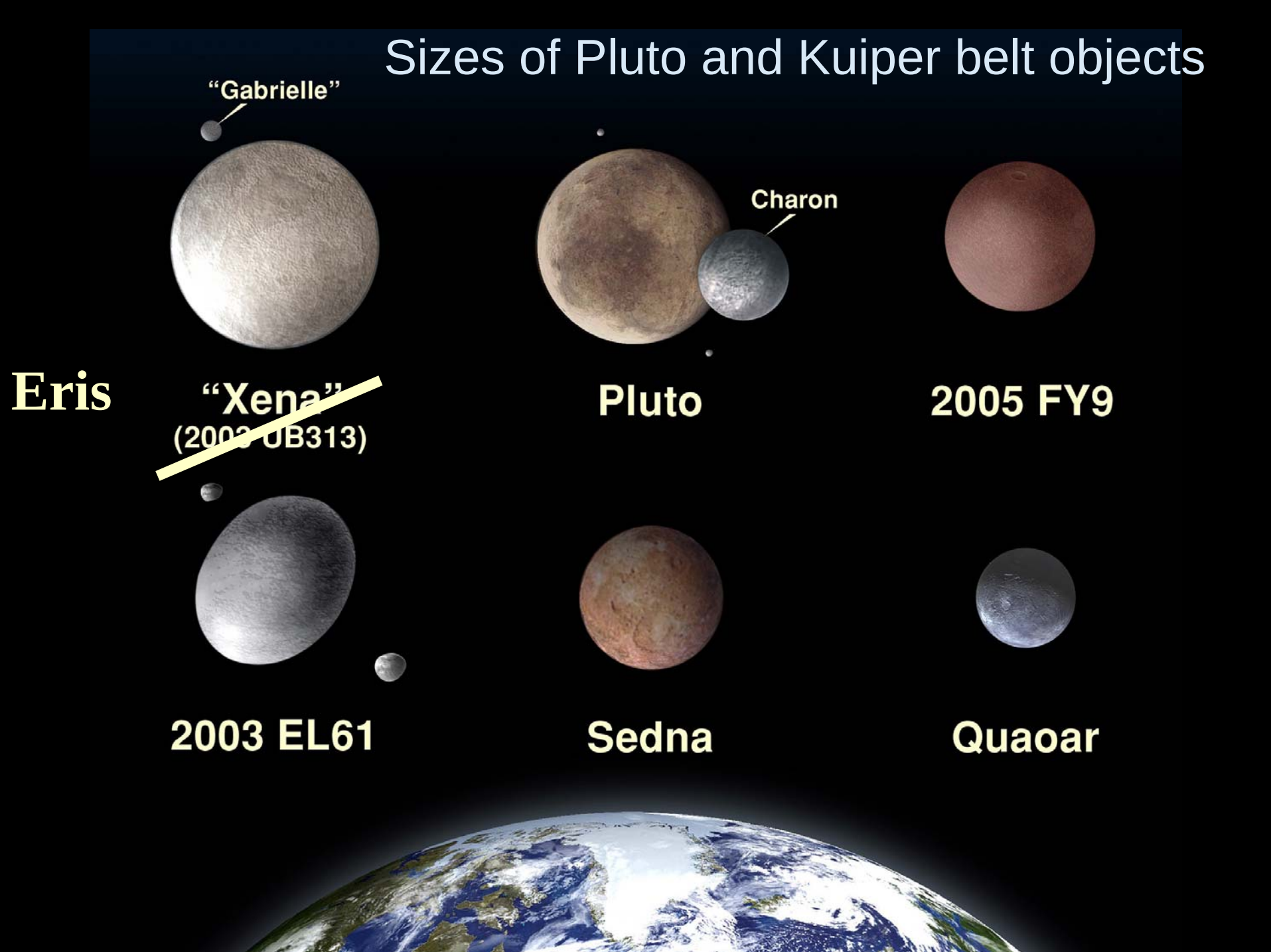
Image courtesy of: Hubble Space Telescope, May 2005,

Pluto and Charon: relative size and color

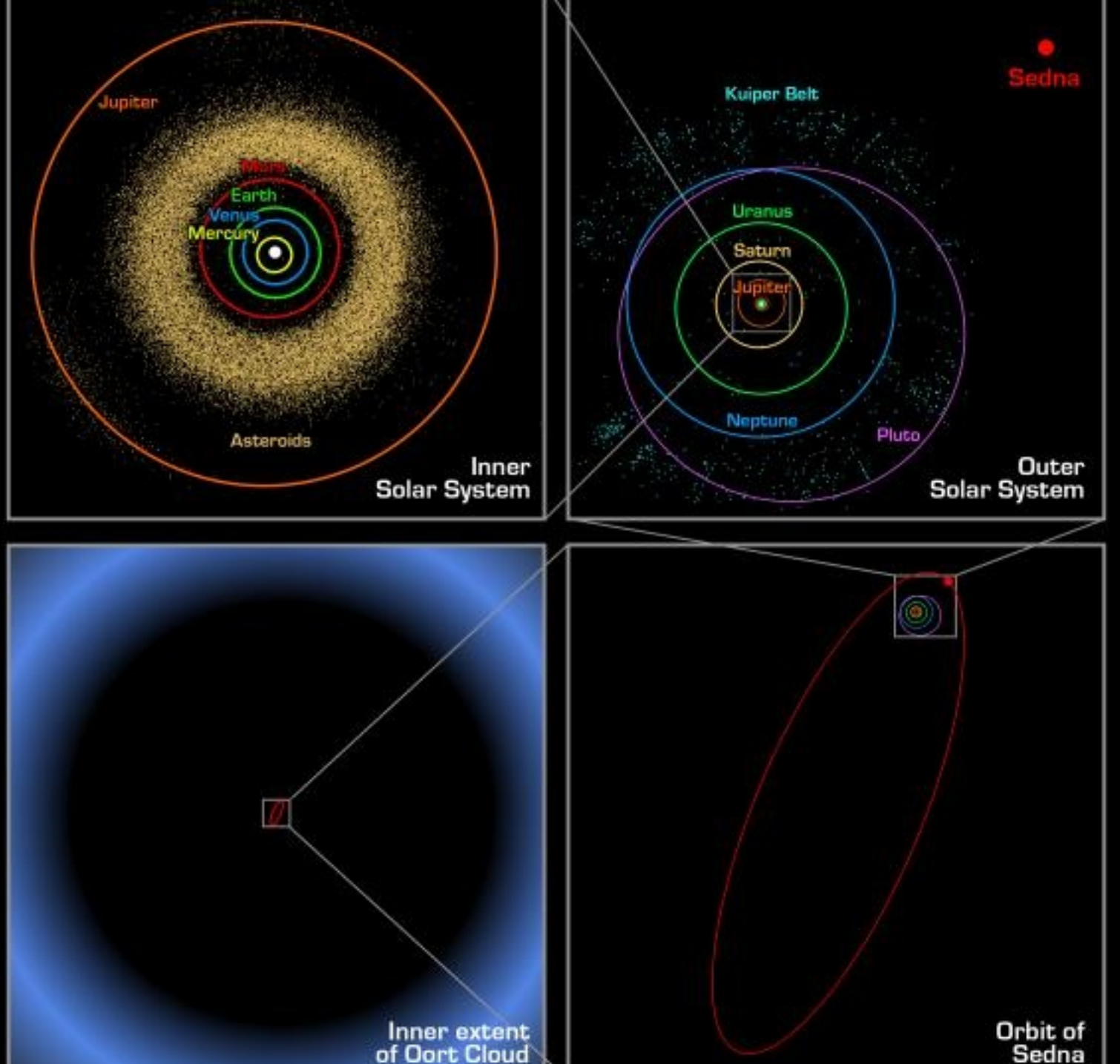


Kuiper belt & Sedna




Sizes of Pluto and Kuiper belt objects
"Gabrielle"
Charon
Eris
"Xena"
(2003 UB313)
Pluto
2005 FY9
2003 EL61
Sedna
Quaoar

Oort cloud


Jupiter
Mars
Earth
Venus
Mercury
Asteroids
Inner
Solar System
Sedna
Kuiper Belt
Uranus
Saturn
Jupiter
Neptune
Pluto
Outer
Solar System
Inner extent
of Oort Cloud
Orbit of
Sedna